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JOURNAL OF THE AMERICAN  
GEOGRAPHICAL AND STATISTICAL SOCIETY.  
MD.CCC.LX.

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JOURNAL  
OF THE  
AMERICAN  
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Vol II.  
1860  
M.DCCC.LX.—PART I.



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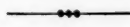
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# CHARTER OF INCORPORATION.

*Granted, April 13th, 1854.*



The People of the State of New York,  
represented in Senate and Assembly, do  
enact as follows :

§ 1. George Bancroft, Henry Grinnell,  
Francis L. Hawks, John C. Zimmerman,  
Archibald Ruffell, Joshua Leavitt, William  
C. H. Waddell, Ridley Watts, S. DeWitt  
Bloodgood, M. Dudley Bean, Hiram Barney,  
Alexander J. Cotheal, Luther B. Wyman,  
John Jay, J. Calvin Smith, Henry V. Poor,  
Cambridge Livingston, Edmund Blunt, Alex-  
ander W. Bradford, and their associates, who  
are now or may become hereafter associated  
for the purposes of this act, are hereby con-

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stituted a body corporate by the name of the  
AMERICAN GEOGRAPHICAL AND STATISTICAL SOCIETY, for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed ; but the real and personal estate which the said Society shall be authorized to take, hold, and convey, over and above its library, and maps, charts, instruments, and collections, shall not at any time exceed an amount, the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of the said Society shall be a President, three Vice-Presidents, a Corresponding Secretary, a Recording Secretary, a Librarian, and Treasurer, and such other

officers as may from time to time be provided for by the By-Laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering the officers above-named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of By-Laws not inconsistent with the laws of this State or of the United States; which code, when formed and adopted at a regular meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers and its members.

§ 5. The Legislature may at any time alter or repeal this act.

§ 6. This act to take effect immediately.

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STATE OF NEW YORK, }  
Secretary's Office. }

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom and of the whole of said original law.

Given under my hand and seal  
of office, at the city of Albany,  
L. S. this thirteenth day of April,  
one thousand eight hundred  
and fifty-four.

A. G. JOHNSTON,  
*Deputy Secretary of State.*

## BY-LAWS.

REVISED, FEBRUARY, 1860.

## CHAPTER I.

## MEMBERS.

The Society shall consist of Resident, Non-Resident, Honorary, Corresponding, and Ex-officio Members.

1. *Resident* Members are those residing in the City of New York, or its vicinity.

2. *Non-Resident* Members are those residing at least twenty-five miles distant from the city.

3. *Honorary* Members shall be limited to the number of Twenty, to be chosen on account of distinction in the science of Geography or Statistics.

4. *Corresponding* Members to be chosen from those who have aided the advancement of Geography or Statistics, and who are in correspondence with the Society.

5. *Ex-officio* Members to be foreign Diplomatic Representatives and Consuls, resident in the United States, and United States Diplomatic Representatives and Consuls in foreign countries—whenever enrolled at their own request or by a vote of the Council.

6. Resident and Non-Resident Members to be elected as follows:—All nominations of Candidates shall be made in writing to the Society or Council, and when elected by the Society, they shall become members on the payment of the initiation fee. No member can be elected by the Society without the previous approval of the Council. And all officers of the Society must be elected from among its members.

7. The name of any Honorary, Corresponding, or Ex-officio member of the Society may, on the recommendation of the Council, be dropped

from the roll of the Society by a vote of two-thirds of the members present at a regular meeting of the Society.

## CHAPTER II.

### INITIATION FEES AND ANNUAL DUES.

1. The initiation fees, to be paid immediately after election, shall be, for a Resident Member, five dollars, and for a Non-Resident Member, three dollars.
2. The annual dues of a Resident Member shall be five dollars; of a Non-Resident Member, three dollars,—to be paid in advance.
3. The name of any Resident or Non-Resident Member neglecting to pay his annual dues for two successive years, may be erased from the list of members by the Council.
4. Any member not in arrears, may commute for life all dues for membership by the payment at one time of fifty dollars.

## CHAPTER III.

### OFFICERS.

1. The officers of the Society shall be, a President, three Vice-Presidents, a Foreign Corresponding Secretary, a Domestic Corresponding Secretary, a Recording Secretary, a Treasurer, a Librarian, and twelve Councillors; and these officers shall together form the Council of the Society.
2. The first annual meeting and election under these By-Laws shall be held on the first Thursday after the first day of May after their adoption, when the term of office of the present officers and members of the Council shall expire.
3. All officers, except as hereinafter provided, shall be elected annually, by ballot, and shall hold their offices until others shall be elected in their places.
4. At the first annual meeting after the adoption of these By-Laws, three Vice-Presidents shall be elected, one of them for one year, one for two years, and one for three years; and twelve Councillors shall be elected, four for one year, four for two years, and four for three years. And at every subsequent annual meeting, one Vice-President and four Councillors shall be elected for three years.
5. All officers to be elected may be voted for on one ballot.



CHAPTER IV.

ANNUAL MEETING.

1. The Annual Meeting of the Society shall hereafter be held on the first Thursday after the first day of May, when the annual election shall take place.
2. No person shall be allowed to vote at said election who has not been a member of the Society at least twenty days, or who is in arrears for his dues.
3. The Council shall report to the meeting its proceedings, and the proceedings of the Society during the past year; and the Secretaries, Treasurer, and Librarian, shall present their reports.

CHAPTER V.

MONTHLY AND SPECIAL MEETINGS.

1. The Society shall, unless otherwise specially ordered by the Council, hold its regular meetings for the transaction of business, on the first Thursday of each month, July, August, and September excepted, and except on the first of May, when that day occurs on Thursday.
2. The President, or in his absence, a Vice-President may, and upon the written request of fifteen members, shall call a special meeting of the Society, by giving three days' notice thereof in two daily newspapers printed in the city of New York.

CHAPTER VI.

ORDER OF BUSINESS.

At the regular meetings of the Society, the order of business shall be as follows:—1. Reading of the Minutes of the last meeting; 2. Nomination of members; 3. Report of the Council; 4. Reports and Communications from the Officers of the Society; 5. Reports from Committees; 6. Unfinished and miscellaneous business; 7. Papers read, and Addresses delivered, before the Society.

CHAPTER VII.

QUORUM.

At the meetings of the Society, nine members shall constitute a quorum for the transaction of business.

## CHAPTER VIII.

## PRESIDING OFFICER.

The President, or in his absence, one of the Vice-Presidents, or in their absence, a Chairman, pro tempore, shall preside at the meetings of the Society, and shall have a casting vote. He shall preserve order, and shall decide all questions of order, subject to an appeal to the Society; he shall also appoint all committees, authorized by the Society, unless otherwise especially ordered; and at every annual meeting he shall appoint two members as tellers of the election, before the opening of the polls.

## CHAPTER IX.

## SECRETARIES.

1. It shall be the duty of the Foreign Corresponding Secretary to conduct the correspondence of the Society with individuals or associate bodies in foreign countries; and of the Domestic Corresponding Secretary to conduct the correspondence of the Society with individuals or associate bodies in the United States. During the vacancy of either office, or the absence of either Secretary, the duties of both may be performed by the remaining Secretary.

2. It shall be the duty of the Recording Secretary to give due notice of the time and place of all meetings of the Society, and to attend the same; to keep fair and accurate records of all proceedings and orders of the Society, and to give notice to the several officers and committees of all votes, orders, resolves, and proceedings of the Society, affecting them, or appertaining to their respective duties; he shall prepare a list of members entitled to vote, to be handed to the tellers, before the opening of the polls at each annual election; he shall officially sign and affix the seal of the Society to all diplomas and documents authorized by the Society or Council; he shall have charge of the Seal, Charter, By-Laws, and Records of the Society; and he shall notify the Council of the resignation of any officer or member of the Society.

3. All documents relating to the Society shall be under the charge of the respective Secretaries, but placed in such depositories in the rooms of the Society as the Council may designate. The respective Secretaries shall keep, in suitable books, to be provided for that purpose, true copies of all letters written by them on behalf of the Society.

4. At the regular meetings of the Society and of the Council, the Secre-

taries shall report their correspondence, and read such portions of it as may be required.

5. The Society may, however, appoint a committee to prepare a letter, or letters, on any special occasion.

#### CHAPTER X.

##### LIBRARIAN.

The Librarian shall, under the direction of the Council, have the general charge and superintendence of the rooms, and the arrangement of the books, maps, and collections belonging to the library of the Society. He shall keep in the rooms of the Society a register of donations, acknowledge their reception by letter to the donors, and report the same, in writing, at each regular meeting of the Society.

#### CHAPTER XI.

##### TREASURER.

The Treasurer shall collect the dues, and keep the funds and securities of the Society, and disburse and dispose of the same, under the direction of the Council.

#### CHAPTER XII.

##### COUNCIL.

1. The Council shall have the management and control of the affairs, property, and funds of the Society.
2. They may frame their own By-Laws, but so as not to be inconsistent with the By-Laws of the Society.
3. They may appoint a General Secretary and subordinates, with such powers, privileges, duties, and monthly compensation, as from time to time they may determine, and may at pleasure revoke such appointments.
4. They shall hold meetings for the transaction of business at least once a month, except during July, August, and September.
5. They shall have power to fill any vacancy among the officers of the Society for the unexpired term of such officer.
6. They shall have power, at their discretion, to declare vacant the seat of any member of the Council, (except the President and Vice-Presidents,) who shall be absent from its meetings for three successive months.
7. They shall have power, by a vote of two-thirds of those present at

any meeting of the Council, to remove any member of their body for cause, provided such two-thirds shall be equal in number to a majority of the Council. It shall, however, be the duty of the Council to report every such vacancy or removal, at the first regular meeting of the Society thereafter, when such cases shall be subject to revision.

8. They shall not, without an approving vote of the Society at a regular meeting, make any contract whereby a liability in amount above one thousand dollars may be incurred; nor make any sale or disposition of the property of the Society exceeding that sum in value.

9. Five members shall constitute a quorum for the transaction of business at the meeting of the Council.

10. The Council may, at their discretion, remit by resolution the initiation fee or annual dues of any resident or non-resident member.

11. They may order the enrollment, as ex-officio members, of such persons as are entitled thereto.

12. No member of the Council shall receive any salary or compensation for his services.

#### CHAPTER XIII.

##### GENERAL PROVISION AS TO DEBT.

No debt shall be incurred without the approval of the Council; nor shall any debt be contracted whereby the aggregate debts of the Society shall be increased more than two thousand dollars above the amount of the unappropriated funds at the time in the treasury.

#### CHAPTER XIV.

##### ALTERATION OF BY-LAWS.

No alteration of the By-Laws of the Society can be made unless openly proposed and entered on the minutes, with the name of the member proposing the same, at a regular meeting of the Society; and adopted at a subsequent regular meeting by a vote of two-thirds of the members present.

AMERICAN GEOGRAPHICAL AND STATISTICAL SOCIETY.

1859-1860.

OFFICERS AND COUNCIL.

President.

FRANCIS L. HAWKS, D.D., LL.D.

Vice Presidents.

HENRY GRINNELL, ARCHIBALD RUSSELL,  
JOSEPH P. THOMPSON, D.D.

Foreign Corresponding Secretary.

JOHN JAY.

Domestic Corresponding Secretary.

MARSHALL LEFFERTS.

Recording Secretary.

E. A. STANSBURY.

Treasurer.

FRANK MOORE.

Librarian.

CHARLES WELFORD.

Council.

HIRAM BARNEY,  
HENRY E. PIERREPONT,  
FREDERICK PRIME,  
HENRY V. POOR,  
EGBERT L. VIELE,  
CHARLES P. DALY,

GEORGE FOLSOM,  
CHARLES F. LOOSEY,  
JOHN W. CHANLER,  
JAMES L. GRAHAM, Jr.,  
JAMES W. BEEKMAN,  
CYRUS W. FIELD.

Committee of Publication.

GEORGE FOLSOM,  
CHARLES P. DALY, LL.D.,

CYRUS W. FIELD,  
FRANK MOORE.

DANIEL W. FISKE, GENERAL SECRETARY.

## HONORARY AND CORRESPONDING MEMBERS.

### HONORARY.

BACHE, Alexander Dallas, LL.D., Superintendent of the United States Coast Survey . . . . . Washington	MIDDENDORFF, Adolph Theodor von, Secretary of the Imperial Academy of Sciences of Russia . . . St. Petersburg
BARTH, Heinrich, PH.D., D.C.L. Berlin	MURCHISON, Sir Roderick Impey, D.C.L. Director-General of the Geological Survey of Great Britain and Ireland . . . London
DE LA ROQUETTE, M., Vice-President of the Geographical Society of Paris . . . Paris	PETERMANN, August, PH.D. . . . . Gotha
FREMONT, John Charles, LL.D. . . . . Mariposa, California	QUETELET, Lambert Adolphe Jacques, President of the Central Commission of Statistics of Belgium . . Brussels
JOMARD, Edme François, Member of the French Institute . . . . . Paris	RAWLINSON, Sir Henry Creswicke, D.C.L. . . . . London
LAYARD, Austen Henry, D.C.L. London	ROBINSON, Edward, D.D., LL.D. New York
MCCLINTOCK, Sir Leopold, LL.D. . . . . London	SIMPSON, Sir George, Governor-in-Chief, Rupert Land . . . . . Leschina, Canada
MAURY, Matthew Fontaine, LL.D., Superintendent of the United States Observatory and Hydrographical Office . . . . . Washington	STRUVE, Otto Wilhelm von . . . . . St. Petersburg

### CORRESPONDING.

ABERT, John J., Col. U.S.A., Chief of the Corps of Topographical Engineers . . . . . Washington	BRADLEY, Daniel B. . . . . Siam
ALEXANDER, John Henry . . . . . Baltimore	CHAIX, Professor Paul . . . . . Geneva
ALFORD, Benjamin, Maj. U.S.A. . . . . Fort Vancouver, Washington Territory	COOK, Charles W. . . . . San Francisco
ARCHBALD, Andrew B. . . . . Paris	CORNELL, Sarah S. . . . . New York
BARCLAY, James T., M.D. . . . . Jerusalem	DE BOW, James Dunwoody Brownson . . . . . Washington
BARNARD, Henry, LL.D., Chancellor of the University of Wisconsin . . . . . Madison	DELAPLAIN, George P. . . . . Madison, Wisconsin
BARTLETT, John Russell, Secretary of State of Rhode Island . . . . . Providence	DICKENS, Asbury . . . . . Washington
BARTLETT, Washington A. . . . . New York	DIXON, James, U.S.S. . . . . Washington
	DRAFER, LYMAN . . . . . Madison, Wisconsin
	DU CHAILLU, Paul Belloni . . . . . New York

DUER, John K., Lieut. U.S.N. Washington	MARSH, George P., LL.D.
DUNCAN, William Henry	Burlington, Vermont
Hanover, New Hampshire	MARTIN, R. Montgomery, F.R.G.S. London
EMORY, William H., Maj. U.S.A.	MASON, Charles Washington
Washington	MAURY, Louis Ferdinand Alfred, General
FOETTERLE, Franz, Secretary of the Imperial and Royal Geographical Society of Austria . . . . . Vienna	Secretary of the Geographical Society of Paris . . . . . Paris
FORCE, Peter . . . . . Washington	MEEHAN, John S., Librarian to Congress
GILMAN, Daniel Coit, Librarian of Yale College . . . . . New Haven	Washington
GREEN, Thomas J. . . . . Washington	NEGRI, Cristoforo, Chief of the Consular Bureau, Foreign Office . . . . . Turin
GULICK, Luther Halsey, M.D.	NEWMARCH, William, Honorary Secretary of the Statistical Society of London
Micronesia Islands	London
GUYOT, Arnold Henry, LL.D.	NORMAN, Benjamin M. New Orleans
Princeton, New Jersey	NYE, Gideon, Jr. . . . . Macao
HARRIS, Townsend, United States Minister in Japan . . . . . Jeddo	OLRIK, C. S. M., Inspector of North Greenland . . . . . Godhavn
HAYES, Isaac I., M.D. Philadelphia	PALMER, AARON H. Washington
HEPBURN, James Curtis, M.D. Siam	PROUDFIT, John, D.D.
HOUGH, Franklin B., M.D. Albany	New Brunswick, New Jersey
JAMESON, William, M.D. Quito	RAE, John, M.D. Hamilton, Canada
KENNEDY, Joseph Camp Griffith, Superintendent of the United States Census	ROGERS, Henry Darwin Glasgow
Washington	SCHADE, Louis, M.D. Washington
KOHL, Johann Georg . . . . . Vienna	SEWARD, William Henry, LL.D. U.S.S.
LAMANSKY, Eugen von, Secretary of the Imperial Russian Geographical Society	Washington
St. Petersburg	SEYMOUR, Horatio, LL.D. Utica
LAPHAM, Increase A., Milwaukee, Wisconsin	SHAW, H. Norton, M.D., Secretary of the Royal Geographical Society London
LACHLAN, R. . . . . Cincinnati	SIMMONS, D. B. . . . . Siam
LEAVENWORTH, Elias W., Syracuse	SMITH, Edward R. Washington
LIVINGSTONE, David, LL.D., D.C.L. Zambesi	SOMERVILLE, Mary Fairfax Florence
LONG, Stephen H., Col. U.S.A. Louisville	STANLEY, Edward Henry, Lord London
LYNCH, William F., Capt. U.S.N.	STEVENS, Isaac I. . . . . Washington
Philadelphia	WARD, Thomas W., Tarrytown, New York
MCCARTEE, Divie Bethune, M.D.	WARING, George E. Jr. New York
Hong Kong	WARNE, Joseph . . . . . Oxford
MCCLELLAND, Robert	WASHINGTON, John, Capt. R.N., Hydrographer to the Lords of the Admiralty
Washington	London
MANSFIELD, Edward D., Commissioner of Statistics of Ohio . . . . . Columbus	WATTS, Burghall G.
	Cartagena, New Granada.

## RESIDENT AND NON-RESIDENT MEMBERS.

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March 1, 1860.

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N. B.—Those having \* preceding their names have compounded for life.

Year of Election.	
1856	Abbott, Gorham D. <i>Fifth Avenue, corner of Thirty-fourth street; and 7 Union Place.</i>
1856	Abrams, John D. <i>233 West Nineteenth street; and 178½ Water street.</i>
1857	Adams, Julius W. <i>353 Fulton street, Brooklyn.</i>
1857	Adamson, James C., D.D. <i>Cape of Good Hope, South Africa.</i>
1857	Addoms, Charles. <i>Gramercy Park House.</i>
1855	Allen, William H. <i>428 Fourth street.</i>
1853	Alsop, Joseph W. <i>33 Washington Square; and 42 South street.</i>
1856	Alvord, Alonzo A. <i>10 West Thirty-first street; and 644 Broadway.</i>
1860	Andersen, Victor Ivan. <i>110 East Fourteenth street.</i>
1856	10 Annan, William C. <i>94 Wall street.</i>
1854	Appleton, John A. <i>36 West Twenty-third street; and 348 Broadway.</i>
1859	*Arnold, Daniel H. <i>350 Fifth Avenue; and 184 Broadway.</i>
1859	Arnoux, William Henry. <i>20 East Thirty-second street; and 150 Nassau street.</i>
1852	Arpin, Paul. <i>44 Irving Place,</i>
1856	Aspinwall, William H. <i>33 University Place.</i>
1853	Astor, John Jacob, Jr. <i>85 Prince street.</i>
1856	Averill, Joseph Otis. <i>196 Second Avenue; and 77 Pearl street.</i>
1859	*Aymar, William. <i>26 Varick street; and 50 South street.</i>
1853	Baird, Rev. Robert, D.D. <i>Yonkers, Westchester County, New York.</i>
1856	20 Baldwin, Simeon. <i>48 East Twenty-fifth street; and 56½ Merchants' Exchange</i>
1856	Ball, Henry. <i>Newburgh; and 247 Broadway.</i>
1852	*Bancroft, Hon. George, LL.D. <i>17 West Twenty-first street.</i>
1856	Barker, Professor Benjamin Fordyce, M.D. <i>70 Union Place.</i>
1859	Barlow, Samuel L. M. <i>229 Fifth Avenue; and 65 Merchants' Exchange.</i>
1858	*Barney, Danford N. <i>80 East Nineteenth street; and 82 Broadway.</i>



Year of  
Election.

- 1852 \*Barney, Hiram. 266 *Fourth street*; and 111 *Broadway*.  
 1856 Barstow, Caleb. 20 *Sands street, Brooklyn*; and 7 *Wall street*.  
 1859 Bartlett, Rev. William Alvin. *Mansion House, Brooklyn*.  
 1856 Bayard, Edward, M.D. 6 *West Fourteenth street*.  
 1856 80 Beadle, Edward L., M.D. 28 *Union Place*.  
 1852 Bean, Moses Dudley. 48 *West Fourteenth street*; and 97 *Pearl street*.  
 1857 Beckman, James W. 5 *East Thirty-fourth street*.  
 1859 Bell, Edward R. 29 *West Twenty-second street*; and 28 *William street*.  
 1859 \*Belmont, Hon. August. 109 *Fifth Avenue*; and 50 *Wall street*.  
 1859 Bernheimer, Isaac. 144 *West Fourteenth street*; and 199 *Broadway*.  
 1856 Berry, Richard. 85 *South Ninth street, Brooklyn*; and 177 *Chatham street*.  
 1859 Bing, Julius. *Athenæum Club*; and 348 *Broadway*.  
 1860 Binssé, Louis B. 40 *West Nineteenth street*; and 88 *Vesey street*.  
 1859 Bird, Matthew. 248 *Madison street*; and 49 *Nassau street*.  
 1856 40 Black, William. 9 *West Thirty-eighth street*; and 247 *Broadway*.  
 1856 Bliss, Dallett. *Brooklyn*; and 70 *Broad street*.  
 1860 Blodgett, William T. 27 *West Thirty-fifth street*; and 115 *Norfolk street*.  
 1852 Bloodgood, Samuel De Witt. 29 *East Twenty-eighth street*; and 64 *Broadway*.  
 1852 Blunt, Edmund. 27 *Monroe Place, Brooklyn*; and 179 *Water street*.  
 1852 Blunt, George W. 189 *West Twelfth street*; and 179 *Water street*.  
 1859 Blunt, Joseph. 9 *Waverley Place*; and 11 *Wall street*.  
 1859 Boardman, Andrew. 108 *Amity street, Brooklyn*; and 128 *Broadway*.  
 1855 Bogert, Henry K. 14 *East Twenty-fifth street*; and 49 *William street*.  
 1855 Bonney, Benjamin W. 18 *West Fourteenth street*; and 38 *Wall street*.  
 1859 50 Boorman, Marcus J. 186 *Second Avenue*; and 110 *Broadway*.  
 1856 Booth, William A. 66 *West Fourteenth street*; and 95 *Front street*.  
 1857 Booth, William T. 66 *West Fourteenth street*; and 95 *Front street*.  
 1859 Bovee, Christian Nestell. 41 *Joralemon street, Brooklyn*; and 52 *Wall street*.  
 1852 Bradford, Alexander W. 9 *East Thirty-fourth street*; and 6 *Wall street*.  
 1859 \*Bradford, Samuel Dexter, Jr. 21 *Washington Square*; and 32 *Vesey street*.  
 1856 Bradish, Hon. Luther, LL.D. 86 *East Sixteenth street*.  
 1859 Brady, James T. 284 *West Twenty-third street*; and 111 *Broadway*.  
 1859 Brady, Hon. John R. 284 *West Twenty-third street*; and 13 *City Hall*.  
 1854 \*Brodhead, John Romeyn. 8 *West Twenty-first street*.  
 1859 60 Brooks, Sidney. *Everett House*.  
 1853 Brower, John H. *Flushing, Long Island*; and 45 *South street*.  
 1859 Brown, Edwin J. 106 *Ninth street*; and 145 *Broadway*.  
 1853 \*Brown, James M. 20 *Waverley Place*; and 59 *Wall street*.  
 1856 Brown, Stewart. 21 *Waverley Place*; and 59 *Wall street*.  
 1858 Brownlow, James H. 184 *Cherry street*.  
 1856 Bunting, John A. 111 *Livingston Place*.

Year of  
Election.

- 1860 Burrall, Stephen E. 4 Bond street; and 24 William street.
- 1859 Burrill, John E. 49 Wall street.
- 1853 Burtus, James A. 122 West Twenty-fourth street; and 284 Pearl street.
- 1858 70 Butler, Charles. 13 East Fourteenth street; and 12 Wall street.
- 1857 Butler, Henry V. 44 East Twenty-first street; and 13 Park Place.
- 1859 Caldwell, William. New York Post Office, Nassau street.
- 1860 Callisen, A., M.D. 127 West Thirty-eighth street.
- 1855 Camp, Hugh N. 93 West Twenty-first street; and 101 Wall street.
- 1859 Campbell, Malcolm. 53 West Thirty-sixth street; and 41 Ann street.
- 1856 Carter, Robert. 5 East Twentieth street; and 530 Broadway.
- 1856 Champlin, Elbert H., M.D., LL.D. 18 Washington Place.
- 1855 Chanler, John Winthrop. 214 Second Avenue; and 50 Exchange Place.
- 1859 Chapin, Edwin Hubbell, D.D. 14 East Thirty-third street.
- 1853 80 Chauncey, William. 23 La Fayette Place; and 10 Old Slip.
- 1856 Chilton, James R., M.D. 125 Fifth Avenue; and 93 Prince street.
- 1856 Churchill, Timothy G. 90 East Eighteenth street; and 79 Cedar street.
- 1859 Clark, Henry E. 122 Duane street.
- 1859 Clason, Augustus W. 135 Second Avenue; and 34 Wall street.
- 1856 Clay, George. 56 Clinton Place.
- 1859 Clift, Smith. 159 Hudson street; and 44 Nassau street.
- 1859 Clute, John D. 182 Second Avenue.
- 1852 Coddington, Thomas B. 131 West Fourteenth street; and 76 Broad street.
- 1856 Codwise, David. 27 St. Mark's Place.
- 1856 90 Coffin, Edmund. Irvington, Westchester County; and Cedar street, corner of Nassau.
- 1856 Coleman, William T. Yonkers, Westchester County, New York; and 88 Wall street.
- 1856 Colgate, Charles C. 28 East Thirty-sixth street; and 6 Dutch street.
- 1856 Colgate, Robert. 11 Madison Square; and 287 Pearl street.
- 1853 Collins, Edward K. 56 Wall street.
- 1854 Colton, George Woolworth. 224 Livingston street, Brooklyn; and 18 Beekman street.
- 1852 \*Colton, Joseph H. Brooklyn; and 172 William street.
- 1852 Congdon, Charles. 87 Remsen street, Brooklyn; and 28 Cliff street.
- 1860 Conkling, Edgar. Pike's Peak, Kansas.
- 1855 Conkling, Frederick A. 103 Tenth street.
- 1856 100 Conner, James. 29 Beekman street.
- 1859 Constant, Joseph A. 33 East Twenty-third street; and 54 Wall street.
- 1856 Cooley, James E. 78 Fifth Avenue.
- 1856 Cooper, Edward. 8 Lexington Avenue; and 17 Burling Slip.
- 1855 Cooper, Peter. 9 Lexington Avenue; and 17 Burling Slip.

**Year of Election.**

- 1856 Cornell, William W. 41 *Grove street*; and 139 *Centre-street*.  
 1859 Cozzens, Abraham M. 42 *Bond street*; and 89 *Water street*.  
 1859 Craven, Alfred W. 27 *West Twenty-ninth street*; and *Rotunda, Park*.  
 1859 Cromwell, Charles. *Rye, Westchester County, New York*; and 19 *William street*.  
 1856 Crooks, Ramsay. 14 *St. Mark's Place*; and 51 *Front street*.  
 1858 110 Crosby, Professor Howard. *Rutgers College, New Brunswick, New Jersey*; and 72 *West Twenty-first street*.  
 1856 Crowen, Thomas J. *Nyack, Rockland County, New York*; and 699 *Broadway*.  
 1854 Culbert, John W. 252 *Henry street, Brooklyn*; and 24 *Old Slip*.  
 1859 Cummings, Rev. Jeremiah W. 93 *East Twenty-ninth street*.  
 1857 Cunard, Edward. *Staten Island*; and 4 *Bowling Green*.  
 1858 Currie, Gilbert E. 143 *Franklin street*; and 79 *Pine street*.  
 1856 Curtis, George William. *Staten Island*.  
 1857 Curtis, James L. 13 *East Twenty-eighth street*; and 24 *William street*.  
 1856 Curtis, Lewis. 11 *East Fourteenth street*; and 15 *Park Place*.  
 1856 Curtis, William E. 98 *East Fifteenth street*; and 106 *Broadway*.  
 1856 120 Dabney, Chales H. 8 *West Thirty-second street*; and 11 *Nassau street*.  
 1855 Daly, Hon. Charles P. 84 *Clinton Place*; and 21 *City Hall*.  
 1855 Dambmann, Charles F. 41 *East Twenty-second street*; and 16 *Park Place*.  
 1857 Davis, Samuel. 10 *East Twenty-fifth street*.  
 1856 Day, Horace H. 114 *Tenth street*; and 23 *Cortlandt street*.  
 1856 De Angelis, Gideon. 42 *West Twenty-ninth street*; and 33 *Wall street*.  
 1856 Degen, Charles R. 7 *Gramercy Park*; and 83 *Beaver street*.  
 1856 Delano, Joseph C. *New Bedford, Massachusetts*.  
 1856 Delano, Warren. *Newburgh*; and 55 *Broadway*.  
 1856 Deming, Richard T. 41 *Wall street*.  
 1856 130 Detmold, William, M.D. 103 *Ninth street*.  
 1859 Devereux, John C. 70 *East Thirtieth street*; and 229 *Broadway*.  
 1859 Dickinson, Edward. 56 *East Thirty-fourth street*.  
 1856 Dillon, Robert. 40 *West Twenty-second street*; and 30 *Burling Slip*.  
 1858 Dinsmore, Curran. 9 *Spruce street*.  
 1856 Dinsmore, Samuel P. 38 *West Seventeenth street*; and 15 *Nassau street*.  
 1852 Disturnell, John. 65 *Nassau street, Brooklyn*; and 419 *Broadway*.  
 1859 Dodge, Robert Johnston. *West Bloomfield, New Jersey*; and 63 *East Fourteenth street*.  
 1856 Dodge, William E. 203 *Madison Avenue*; and 19 *Cliff street*.  
 1856 Dodge, William E. Jr. 43 *West Thirty-first street*; and 19 *Cliff street*.  
 1856 140 Doremus, Professor Robert Ogden, M.D. 70 *Union Place*; and 90 *East Thirtieth street*.  
 1856 Douglas, John Hancock, M.D. 12 *Clinton Place*.  
 1856 Douglass, Andrew E. 89 *Wall street*.

Year of  
Election.

- 1859 Doyle, John T. 9 *Waverley Place*; and 65 *Wall street*.  
 1856 Duncan, Alexander W. 2 *Washington Square*; and 9 *Nassau street*.  
 1856 Duncan, William Butler. 288 *Fifth Avenue*; and 9 *Nassau street*.  
 1856 Dunnel, Henry G., M.D. 51 *St. Mark's Place*.  
 1855 Dunshee, Henry W. 36 *West Tenth street*.  
  
 1856 Edgar, James A. 48 *West Twenty-fifth street*; and 95 *Front street*.  
 1860 Elliott, Charles W. *Athenæum Club*; and *Union Place Hotel*.  
 1852 150 Elliott, Samuel M., M.D. 7 *Astor Place*.  
 1856 Ellis, Samuel C., M.D. 179 *Second Avenue*.  
 1856 Elphinstone, William H. 112 *East Twenty-first street*.  
 1856 Ellsworth, Henry. 143 *West Fourteenth street*.  
 1856 Ely, Abner L. 51 *East Thirty-seventh street*; and 31 *Pine street*.  
 1854 Ely, Charles. *Springfield*; and 264 *Greenwich street*.  
 1856 Embury, Daniel. 74 *Clark street, Brooklyn*.  
 1856 Emmet, Robert. 122 *Madison Avenue*; and 45 *William street*.  
 1856 Emmet, Thomas Addis. 24 *University Place*; and 45 *William street*.  
 1859 Evarts, William M. 7 *West Fourteenth street*; and 2 *Hanover street*.  
 1853 160 Eyre, Henry S. P. 22 *East Thirty-sixth street*; and 74 *Broad street*.  
  
 1856 Faile, Edward G. *West Farms, Westchester County, New York*; and 193 *Chambers street*.  
 1856 Fairchild, Rev. Ezra R., D.D. 156 *Chambers street*.  
 1853 Fearing, Daniel B. 73 *Fifth Avenue*.  
 1856 Felt, William N. 21 *Bond street*; and 9 *Park Place*.  
 1856 Ferguson, John. 35 *Pine street*.  
 1856 Fernbach, Henry. 120 *First Avenue*; and 835 *Broadway*.  
 1858 Ferrer, Firmin. 11 *Cottage Place*.  
 1858 Ferris, Isaac, D.D. LL.D., Chancellor of the University. 80 *East Twelfth street*.  
 1856 Fiedler, Ernest. *Staten Island*; and 32 *Broadway*.  
 1856 170\*Field, Benjamin H. 21 *East Twenty-sixth street*; and 127 *Water street*.  
 1854 \*Field, Cyrus W. 84 *East Twenty-first street, Gramercy Park*; and 57 *Beekman street*.  
  
 1856 Field, David Dudley. 86 *East Twenty-first street*; and 122 *Broadway*.  
 1860 Field, Rev. Henry M. 102 *East Eighteenth street*; and 5 *Beekman street*.  
 1852 \*Field, Hickson W. 352 *Fifth Avenue*.  
 1857 Fischel, Rev. Arnold, D.D. 5 *Carroll Place*.  
 1854 Fish, Hon. Hamilton. *Seventeenth street, corner of Second Avenue*.  
 1855 Fisher, Richard Swainson, M.D. *De Kalb Avenue, Brooklyn*.  
 1859 Fiske, Daniel Willard. *Athenæum Club*; and *Clinton Hall, Astor Place*.  
 1856 Fitch, Samuel S., M.D. 714 *Broadway*.  
 1853 180 Fitz, Henry. 237 *Fifth street*.

Year of  
Election.

- 1852 Fleming, Augustus. 10 *Bond street*.  
 1859 Flint, Alden S. 56 *West Thirty-seventh street*; and 5 *Beekman street*.  
 1859 \*Fogg, William H. 53 *West Twenty-third street*; and 82 *Burling Slip*.  
 1852 \*Folsom, Hon. George. 212 *Second Avenue*.  
 1856 Ford, James K. *Brooklyn*; and 115 *Wall street*.  
 1857 Foster, James C., M.D. 202 *Bleecker street*.  
 1856 Foster, Frederick G. 13 *East Fifteenth street*; and 65 *South street*.  
 1859 Fowler, Edward P., M.D. 20 *East Eleventh street*.  
 1856 Fowler, Frederick R. 11 *East Twenty-sixth street*; and 142 *Front street*.  
 1856 190 Fowler, Hon. Isaac V. *New York Hotel*; and *New York Post Office*.  
 1858 Francis, John Wakefield, M.D., LL.D. 1 *Bond street*.  
 1856 Fraser, Thomas. 20 *West Twenty-second street*; and 38 *Ferry street*.  
 1853 French, Benjamin F. 94 *Clinton Place*; and 26 *William street*.  
 1858 Frothingham, James H. 94 *Remsen street, Brooklyn*; and 106 *Wall street*.  
 1856 Frye, Jed. 72 *West Thirty-first street*; and 46 *Water street*.  
 1856 Fuller, Dudley B. 42 *West Fourteenth street*; and 139 *Greenwich street*.  
 1860 Fuller, William James Appleton. *East Twenty-ninth street*; and 23 *Cortlandt street*.  
  
 1853 Gaillard, Joseph. 680 *Broadway*.  
 1860 Gajani, Guglielmo. 40½ *East Eleventh street*; and 43 *Wall street*.  
 1859 200 Gerdes, Ferdinand H. 80 *East Twenty-ninth street*.  
 1856 Gescheidt, Anthony, M.D. 44 *Clinton place*.  
 1857 Gesner, Abraham. 58 *Cortlandt street*.  
 1856 Gibson, Ebenezer. 7 *East Thirtieth street*; and 143 *Front street*.  
 1857 Gillette, Rev. Abraham D., D.D. 29 *West Twenty-third street*.  
 1852 Goodhue, Robert C. 253 *Fifth Avenue*; and 64 *South street*.  
 1859 Gould, Charles. 5 *Madison Square*; and 62 *Wall street*.  
 1859 Graham, Henry Beekman. 21 *Washington Square*; and 32 *Vesey street*.  
 1860 Graham, James Lorimer. 21 *Washington Square*; and 108 *Broadway*.  
 1859 \*Graham, James Lorimer, Jr. 4 *Washington Square*.  
 1859 210 Graham, Robert McCoskry. 21 *Washington Square*; and 108 *Broadway*.  
 1856 Grant, Oliver D. F. 65 *East Twentieth street*; and 62 *Wall street*.  
 1854 Grant, S. Hastings. *Mercantile Library, Clinton Hall, Astor Place*.  
 1857 Green, Horace, M.D. 12 *Clinton Place*.  
 1852 \*Green, John C. 10 *Washington Square*; and 71 *South street*.  
 1857 Greene, John W., M.D. 34 *Seventh Avenue*.  
 1856 Greenwood, Isaac J. 142 *West Fourteenth street*.  
 1853 Grinnell, Cornelius. 17 *Bond street*; and 40 *Burling Slip*.  
 1852 Grinnell, Henry. 17 *Bond street*; and 61 *Pine street*.  
 1853 Grinnell, Moses H. 1 *East Fourteenth street*.

Year of  
Election.

- 1857 220 Grinnell, William M. 17 *Bond street.*
- 1856 Griswold, Almon W. 13 *East Thirtieth street ; and 60 Wall street.*
- 1856 Groshon, John. 134 *Waverley Place.*
- 1856 Guernsey, Egbert, M.D. 10 *West Twenty-third street.*
- 1857 Gunn, Alexander, M.D. 342 *Bleecker street.*
- 1857 Haight, Rev. Benjamin I., D.D. 56 *West Twenty-sixth street.*
- 1856 Haight, Richard K. *Fifth Avenue, corner of Fifteenth street ; and 57 Broadway.*
- 1856 Hall, Valentine G. 16 *Gramercy Park.*
- 1856 Halstead, Caleb O. 155 *Second Avenue ; and 40 Wall street.*
- 1857 Hamilton, George F. 805 *Broadway.*
- 1856 230 Hardcastle, Thomas H. 179 *West Twenty-eighth street ; and 1 William street.*
- 1852 Hargons, Peter A. 76 *Fifth Avenue ; and 33 South street.*
- 1857 Harris, Elisha, M.D. 253 *Fourth Avenue.*
- 1855 Harrison, Thomas F. 81 *West Thirty-ninth street ; and 41 Greenwich Avenue.*
- 1859 \*Harsen, Jacob, M.D. 69 *Ninth street.*
- 1854 Hasbrouck, A. Bruyn. *Kingston, Ulster County, New York.*
- 1859 Hatch, George W. 29 *William street.*
- 1859 \*Havemeyer, John C. 44 *Wall street.*
- 1856 Hawes, William E. 395 *Canal street.*
- 1852 \*Hawks, Rev. Francis L., D.D., LL.D. 64 *East Twenty-first street.*
- 1856 240 Hedden, Josiah. 59 *Broadway.*
- 1857 \*Hedges, Timothy. 19 *West Twentieth street.*
- 1859 Hedrick, Benjamin S. 18 *Phelps Place ; and 6 City Hall.*
- 1859 Henderson, John C. *Staten Island ; and 343 Broadway.*
- 1856 Herring, Silas C. *Everett House ; and 251 Broadway.*
- 1855 Hewitt, Abram S. 9 *Lexington Avenue ; and 17 Burling Slip.*
- 1857 Heye, Ernest. 76 *Beaver street.*
- 1857 Higbee, Rev. Edward Y., D.D. 19 *West Twenty-sixth street.*
- 1859 Hilton, Hon. Henry. 11 *East Twenty-eighth street ; and 21 City Hall.*
- 1859 Hodges, George W. *Staten Island ; and 42 Exchange Place.*
- 1856 250 Hodges, John T. 645 *Houston street ; and 271 Broadway.*
- 1859 Holmes, Robert D. 459 *Canal street ; and 7 Chambers street.*
- 1858 \*Holton, David Parsons, M.D. 71 *West Seventeenth street.*
- 1856 Homans, Sheppard. 94 *Broadway.*
- 1856 Howland, Williams. 126 *Congress street, Brooklyn ; and 106 Wall street.*
- 1858 Hunt, Richard M. 49 *West Thirty-fifth street ; and 128 Broadway.*
- 1856 Hunt, Wilson G. *Clarendon Hotel ; and 80 Park Place.*
- 1856 Hunter, James. 220 *Tenth street ; and 174 Front street.*

Year of  
Election.

- 1859 Ireland, John B. 4 Lexington Avenue; and 69 Wall street.
- 1858 Irvin, Richard. 21 West Twenty-first street; and 98 Front street.
- 1858 260 Irvin, William. Rutgers College, New Brunswick, New Jersey.
- 1856 Jarvis, Jay. 7 Forsyth street; and 53 Bowery.
- 1859 Jarvis, Nathaniel, Jr. Eighth Avenue, North of West One Hundred and Forty-fifth street; and 13 City Hall.
- 1856 Jaudon, Sammel. East Eighty-fourth street; and 54 Wall street.
- 1852 \*Jay, John. Katonah, Westchester County, New York.
- 1856 Jesup, Morris K. 65 East Nineteenth street; and 44 Exchange Place.
- 1855 Johnson, Bradish. 147 Fifth Avenue; and 110 Front street.
- 1856 Johnston, James B. 56 Tenth street; and 90 Broadway.
- 1855 Johnston, John T. 8 Fifth Avenue; and 69 Wall street.
- 1858 Jones, Charles. 89 Madison street.
- 1859 270 Jones, George A. 28 University Place; and 79 William street.
- 1852 \*Jones, John D. 87 East Fifteenth street; and 51 Wall street.
- 1855 \*Jones, Rev. Lot. 77 Second Avenue.
- 1857 Jones, Lewis C. St. Julien Hotel, Washington Place.
- 1859 Joy, Professor Charles A. Columbia College, East Forty-ninth street.
- 1859 Judson, William. 88 Park Row.
- 1855 Kearny, Edward. 42 East Twenty-first street; and 139 Front street.
- 1854 Kennedy, Robert Lenox. 99 Fifth Avenue and 63 Beaver street.
- 1860 Kensett, John F. Waverley House; Fourth street.
- 1856 Ketchum, Hiram, Jr. 80 East Twenty-second street; and 19 Wall street.
- 1858 280 Kimball, Richard B. 49 Wall street.
- 1854 King, Charles, LL.D., President of Columbia College. Columbia College, East Forty-ninth street.
- 1852 Kingsland, Ambrose C. 114 Fifth Avenue; and 55 Broad street.
- 1856 Kirkwood, James P. 353 Fulton street, Brooklyn.
- 1858 \*Knapp, Shepherd. Washington Heights; and 33 Wall street.
- 1856 Kneeland, Charles. 49 William street.
- 1856 Knevitt, George M. Nevins street, Brooklyn; and 65 Wall street.
- 1856 Knoedler, Michael. 772 Broadway.
- 1856 Lamson, Charles. 112 Tenth street; and 38 Burling Slip.
- 1859 Lane, Thaddeus. 40 West Thirty-eighth street; and 76 Beaver street.
- 1856 290 Lanier, James F. D. 54 Tenth street; and 52 Wall street.
- 1859 Larocque, Jeremiah. 145 West Twenty-third st; and 65 Merchants' Exchange.
- 1859 \*Lathers, Richard. New Rochelle; and 33 Pine street.
- 1854 Lawrence, Alexander M. 82 East Twenty-first street; and 11 South William street.

Year of  
Election.

- 1856 Leake, Godfrey W. *Manhattanville*; and 395 *Canal street*.
- 1859 \*Leavitt, Rev. Joshua. 5 *Beekman street*.
- 1859 Leconte, John L., M.D. *Philadelphia*.
- 1854 Lefferts, Marshall. 423 *Fourth street*; and 90 *Beekman street*.
- 1859 Lenox, James. *Fifth Avenue*, corner of *Twelfth street*.
- 1856 Little, Edward B. 20 *Washington Place*; and 49 *Merchants' Exchange*.
- 1859 300 Livingston, Cambridge. 20 *Nassau street*; and 353 *Tenth street*.
- 1857 Locke, Richard B. *Staten Island*; and 339 *Broadway*.
- 1856 Lockwood, Le Grand. 127 *West Fourteenth street*; and 22 *William street*.
- 1858 Loomis, Professor Elias. *New York University*.
- 1857 Loomis, Hezekiah B. 30 *University Place*.
- 1859 Loosey, Charles F. 10 *West Fourteenth street*; and 2 *Hanover Square*.
- 1857 Lord, James Couper. 91 *East Twentieth street*; and 139 *Greenwich street*.
- 1859 Lorillard, George. *Rhinebeck, Dutchess County, New York*.
- 1857 \*Low, Abiel A. *Brooklyn*; and 31 *Burling Slip*.
- 1859 \*Loyd, William. *University Building, Washington Square*.
- 1859 810 Lydig, Philip, Jr. 34 *Laight street*.
- 1859 MacMullen, John. *Twentieth street*, corner of *Broadway*.
- 1859 Mallory, James E. 141 *Ninth street*; and 39 *William street*.
- 1856 Manners, David S. 173 *Barrow street, Jersey City*; and 7 *Wall street*.
- 1859 Marble, Manton. 149 *Ninth street*.
- 1856 Marsh, Samuel. *Astor House*; and 45 *John street*.
- 1857 Mason John. 206 *Wooster street*.
- 1856 Mason John L. 232 *Fourth street*; and 111 *Broadway*.
- 1856 Mason Sidney. 132 *Fifth Avenue*.
- 1857 Mayo, William Starbuck, M.D. 132 *Second Avenue*.
- 1859 320 McCormick, Richard C. 24 *Wall street*.
- 1852 McKaye, James. *Brooklyn*; and 32 *Broadway*.
- 1856 McKillop, John. 37 *Park Row*.
- 1852 McViekar, William H. 28 *East Thirteenth street*.
- 1854 Merriam, E. *Brooklyn Heights*.
- 1856 Meyer, Henry. 41 *West Seventeenth street*; and 30 *Cliff street*.
- 1859 Millard, Henry Benton, M.D. 61 *Madison Avenue*.
- 1856 Miller, Edmund H. 165 *West Fourteenth street*; and 1 *Hanover street*.
- 1856 Miner, William, M.D. 65 *Irving Place*.
- 1857 Minturn, James B. 29 *Burling Slip*.
- 1856 330 Minturn, Robert B. 60 *Fifth Avenue*; and 73 *South street*.
- 1858 Minturn, Robert B., Jr. 60 *Fifth Avenue*; and 73 *South street*.
- 1856 Minturn, Thomas R. *Staten Island*; and 115 *Pearl street*.
- 1856 Mitchill, Samuel Latham. 25 *Union Place*; and 13 *Broadway*.
- 1856 Monroe, Ebenezer. 26 *Dominick street*; and 247 *Broadway*.



Year of  
Election.

- 1853 Moore, George Henry. 36 *West Eighteenth street*; and *New York Historical Society*.
- 1859 Moore, Frank. 37 *West Eighteenth street*; and *Athenæum Club*.
- 1854 Mcran, Charles. 63 *Irving Place*; and 1 *Hanover Square*.
- 1856 Morgan, Hon. Edwin D., Governor of New York. *Albany*; and 35 *La Fayette Place*.
- 1858 Morgan, Matthew. 12 *Washington Place*; and 27 *William street*.
- 1854 340 Morgan, Elisha E. 70 *South street*.
- 1859 Morrell, William H. 293 *Fifth Avenue*; and 90 *Warren street*.
- 1856 Morse, Anthony Wellman. *New Haven*; and 63 *Wall street*.
- 1850 Morse, Samuel Finley Breese, LL.D. 5 *West Twenty-second street*.
- 1854 Morse, Sidney Edwards. 33 *East Twenty-second street*; and 31 *Park Row*.
- 1856 Mount, Alfred R. 5 *West Twentieth street*; and 64 *Wall street*.
- 1857 Muhlenberg, Rev. William A., D.D. 53 *West Twentieth street*.
- 1856 Murdock, Uriel A. 291 *Fifth Avenue*; and 11 *Nassau street*.
- 1852 Myers, T. Bailey. 132 *Fifth Avenue*; and 229 *Broadway*.
- 1858 Nairne, Professor Charles M. 117 *West Thirty-fourth street*; and *Columbia College*.
- 1857 350 Nash, Alanson. 31 *West Thirty-fifth street*; and 36 *Beekman street*.
- 1856 Negus, Thomas S. 648 *Houston street*; and 100 *Wall street*.
- 1856 Neilson, Anthony B. 31 *East Twenty-second street*; and 49 *Wall street*.
- 1856 Niblo, William. 576 *Broadway*.
- 1856 Nichols, Effingham H. 377 *Fourth street*; and 21 *Nassau street*.
- 1856 Nichols, William S. 28 *Washington Place*; and 50 *Wall street*.
- 1859 \*Norrie, Adam. 281 *Fifth Avenue*; and 90 *Broadway*.
- 1858 Norton, Charles B. 348 *Broadway*.
- 1856 Norton, Robert. 5 *South street*.
- 1858 Noyes, Rev. Daniel P. 62 *East Twenty-seventh street*; and 11 *Bible House*.
- 1859 360 Noyes, James O. 141 *Eighth street*; and 16 *Jacob street*.
- 1856 Noyes, William Curtis. 88 *West Eleventh street*; and 111 *Broadway*.
- 1859 Nugent, Edward. *Brooklyn*.
- 1856 Oakley, Edward J. 133 *West Twenty-third street*; and 185 *Greenwich street*.
- 1859 O'Connor, Bartholomew. 34 *St. Mark's Place*; and 41 *Ann street*.
- 1856 Oelrichs, Edwin A. 68 *Broad street*.
- 1859 Ogden, William B. *Chicago, Illinois*.
- 1859 O'Horman, Richard. 101 *Willow street, Brooklyn*; and 122 *Broadway*.
- 1857 Opdyke, George. 79 *Fifth Avenue*; and 36 *Barclay street*.
- 1845 Osgood, Rev. Samuel S., D.D. 154 *West Eleventh street*.

Year of  
Election.

- 1859 870 Paine, John. 140 *Fifth Avenue*; and 47 *Wall street*.
- 1856 Parmly, Ehrick. 83 *East Twenty-seventh street*; and 3 *Bond street*.
- 1856 Pavenstedt, Edmund. 88 *New street*.
- 1859 Pell, Alfred, Jr. 89 *Madison Avenue*; and 61 *Pine street*.
- 1858 Pellew, Henry E. 53 *Wall street*.
- 1859 Peltz, Edward. 14 *North William street*.
- 1856 Penfold, Edmund. 87 *Fifth Avenue*; and 178 *Front street*.
- 1859 Perris, William. 494 *Broome street*.
- 1856 Perit, Pelatiah. *Bloomingdale*; and 64 *South street*.
- 1830 \*Phelps, Royal. 22 *East Sixteenth street*, and 45 *Exchange Place*.
- 1855 380 Pierrepont, Hon. Edwards. 103 *Fifth Avenue*; and *City Hall*.
- 1852 \*Pierrepont, Henry E. *Pierrepont Place, Brooklyn*.
- 1856 Pierson, Henry L., 28 *West Nineteenth street*; and 24 *Broadway*.
- 1853 Pinney, Rev. John B., D.D. *East Ninety second street, corner of Fourth Avenue*; and 27 *Bible House*.
- 1852 \*Poor, Henry V. 81 *St. Mark's Place*; and 9 *Spruce street*.
- 1856 Porter, Mortimer. 110 *Ninth street*; and 25 *Nassau street*.
- 1859 Porter, Peter B. *Niagara Falls*.
- 1856 Potter, Gilbert, Jr. 5 *Bedford Avenue, Brooklyn*; and 25 *Burling Slip*.
- 1855 Powers, Thomas J. 216 *West Fourteenth street*; and 50 *Wall street*.
- 1853 Pratt, George W. *Kingston*; and 89 *Gold street*.
- 1853 390 Pratt, Zadock. 89 *Gold street*.
- 1852 \*Prime, Frederick. *New Rochelle, Westchester County, New York*.
- 1859 \*Prime, Frederick E. 54 *Wall street*.
- 1859 Pritchard, William M. 8 *Wall street*.
- 1855 Pullen, John A. 317 *Fifth Avenue*; and 74 *Broadway*.
- 1859 \*Punnett, James. *Bloomingdale*; and 44 *Wall street*.
- 1859 Purser, George H. 93 *West Eleventh street*; and 1 *Tryon Row*.
- 1857 Pyne, Percy R. 25 *East Twenty-second street*; and 44 *South street*.
- 1860 Raasloff, W. de, Chargé d'Affaires of Denmark. *Staten Island*; and *Washington*.
- 1856 Randolph, Anson D. F. 707 *Houston street*; and 683 *Broadway*.
- 1856 400 Rankin, Robert G. *Washington Heights*; and 159 *Front street*.
- 1859 Rapallo, Charles A. 99 *West Twentieth street*; and 65 *Wall street*.
- 1856 \*Raphall, Rev. Morris J., R.H.D. 107 *Macdougal street*.
- 1859 \*Ray, Robert, Jr. 221 *West Twenty-eighth street*.
- 1857 Reid, John W. 138 *Mercer street*; and 11 *Old Slip*.
- 1856 Remsen, William. 26 *Waverley Place*; and 5 *Wall street*.
- 1856 Richards, Joseph W., M.D. 12 *Clinton Place*.
- 1856 Riker, John H. 150 *Nassau street*.

Year of  
Election.

- 1856 Robbins, George S. *Throg's Neck, Westchester County, New York; and 54 William street.*
- 1856 Robbins, Henry A. *Clarendon House; and 182 Broadway.*
- 1859 410 Robinson, Asa P. *Brooklyn; and 110 Broadway.*
- 1853 Robinson, Henry B. *121 West Thirty-sixth street; and 98 Broadway.*
- 1856 Rockwell, Charles W. *Everett House; and Broadway, corner of Wall street.*
- 1853 Roosevelt, Clinton. *University Buildings.*
- 1859 Roosevelt, James I. *836 Broadway.*
- 1856 Root, Russell C. *116 Lexington Avenue; and 16 Nassau street.*
- 1856 Rowe, Jacob. *Poughkeepsie; and 8 Broadway.*
- 1859 Rudder, Rev. William. *7 West Nineteenth street.*
- 1854 Ruggles, Samuel B. *24 Union Place; and 6 Wall street.*
- 1852 \*Russell, Archibald. *45 Tenth street.*
- 1856 420 Russell, Charles H. *2 Great Jones street.*
- 1856 Russell, William H. *686 Broadway.*
- 1854 Rutherford, Lewis M. *175 Second Avenue; and 180 Tenth street.*
- 1856 Sampson, Joseph. *2 Bond street.*
- 1859 Sanderson, James M. *New York Hotel.*
- 1859 Sanford, Henry S. *Derby, Connecticut.*
- 1856 Sargent, Epes W. *15 Broadway.*
- 1853 Satterthwaite, Theophylact B. *61 William street.*
- 1859 \*Schell, Augustus. *22 West Twenty-first street; and Custom House.*
- 1856 Schieffelin, Sidney A. *220 Fifth Avenue; and 170 William street.*
- 1856 430 Schermerhorn, William C. *41 West Twenty-third street; and 63 Wall street.*
- 1856 Schroeter, George. *Paterson, New Jersey; and 264 Canal street.*
- 1856 Schuchardt, Frederick. *29 Washington Place; and 21 Nassau street.*
- 1857 Seabury, Rev. Samuel, D.D. *125 West Thirteenth street.*
- 1856 Sears, Herman B. *71 West Twenty-second street; and 18 Maiden Lane.*
- 1854 Sewall, Henry F. *73 South street.*
- 1857 Seyton, Charles S. *36 East Twenty-fifth street; and 30 William street.*
- 1856 Shaffer, Chauncey. *71 East Twenty-fifth street; and 5 Beekman street.*
- 1856 Sheffield, Joseph B. *40 East Twenty-second street; and 63 Beekman street.*
- 1856 Sheldon, Preston. *47 Pike street; and 92 Market Slip.*
- 1856 Shepherd, Daniel. *124 West Fourteenth street; and 37 Pine street.*
- 1857 440 Sheppard George F. *St. Nicholas Hotel.*
- 1856 Sherman, Watts. *170 Fifth Avenue; and 11 Nassau street.*
- 1857 Sherwood, John. *6 West Eleventh street; and 104 Broadway.*
- 1853 Sibell, William E. *57 Second Avenue; and 12 Wall street.*
- 1857 Simes John D. *10 Lexington Avenue; and 17 South William street.*
- 1857 Smith, Edwin. *Cairo, Egypt.*

Year of  
Election.

- 1853 Smith, James McCune, M.D. 15 *North Moore street*; and 55 *West Broadway*.  
 1853 Smith, James O., M.D. 81 *Clinton Place*.  
 1852 Smith, John Calvin. 71 *Nassau street*.  
 1856 450 Smith, Uriah J. 38 *East Fourteenth street*; and 23 *Liberty street*.  
 1856 Spencer, Lorillard. 85 *Fifth Avenue*.  
 1856 Spofford, Paul N. 4 *East Fourteenth street*; and 17 *Broadway*.  
 1855 Squier, Ephraim George. 16 *St. Mark's Place*.  
 1859 Stallknecht, Frederic Stoud. *Clinton Avenue, Brooklyn*; and 169 *Broadway*.  
 1860 Stansbury, Edward A. 405 *Fourth street*; and 103 *Broadway*.  
 1856 Stebbins, Henry G. 2 *West Sixteenth street*; and 51 *Exchange Place*.  
 1853 Stevens, Rev. Abel, D.D. 186 *East Fifteenth street*.  
 1859 Stevens, Hon. Thaddens, M.C. *Lancaster, Pennsylvania*; and *Washington*.  
 1859 Stewart, Alexander T. 7 *Depau Row*; and *Broadway, corner of Chambers street*.  
 1859 460 Stilwell, Benjamin M. 128 *West Thirty-first street*; and 11 *Chambers street*.  
 1859 Stirling, Thomas B., M.D. 10 *University Building*.  
 1856 Stokes, Benaiah G. 46 *West Twenty-fifth street*; and 29 *Cliff street*.  
 1856 Storm, Walter. *Bergen, New Jersey*; and 104 *Broad street*.  
 1860 Stout, Francis A. 54 *Ninth street*.  
 1856 Stout, Theodore. *St. Denis Hotel*; and 11 *Nassau street*.  
 1853 Straznicky, Edward Richard. *Astor Library, La Fayette Place*.  
 1859 Strong, George T. 74 *East Twenty-first street*; and 68 *Wall street*.  
 1860 Stuart, Alexander. 167 *Chambers street*.  
 1853 Stuart, Robert L. 154 *Fifth Avenue*; and 171 *Chambers street*.  
 1856 470 Sturgis, Russell. 164 *Tenth street*; and 68 *South street*.  
 1853 Suydam, Peter M. 25 *Waverley Place*.  
 1856 Talmage, Daniel. 60 *Water street*.  
 1857 Taylor, Bayard. 8 *St. George's Place*.  
 1855 Taylor, Hon. George. *Brooklyn*; and 5 *Broad street*.  
 1857 Taylor, Isaac E., M.D. 13 *West Twentieth street*.  
 1859 Taylor, William B. *New York Post Office, Nassau street*.  
 1855 Tellkampff, Theodore A., M.D. 198 *Fourth street*.  
 1857 \*Thompson, David. 25 *La Fayette Place*; and 52 *Wall street*.  
 1857 Thompson, John. 11 *Varick Place*.  
 1854 490 Thompson, Rev. Joseph P., D.D. 32 *West Thirty-sixth street*.  
 1859 Thompson, William C., F.R.S. 74 *West Twenty-third street*; and 26 *Pine street*.  
 1856 Thomson, John. 285 *Greenwich street*.  
 1856 Thurston, Frederick G. 49 *South street*.  
 1856 Tibbetts, Henry B. 111 *Broadway*.  
 1856 \*Tiffany, Charles L. 175 *Tenth street*; and 550 *Broadway*.

Year of  
Election.

- 1854 Tileston, Thomas. 2 *East Fourteenth street*; and 29 *Broadway*.  
 1856 Tillou, Francis R. 5 *Wall street*.  
 1852 Tomes, Benjamin. 84 *East Twenty-second street*; and 6 *Maiden Lane*.  
 1855 Tomes, Francis, Jr. 12 *West Twenty-first street*; and 6 *Maiden Lane*.  
 1857 490 Townsend, Effingham. 120 *Fifth Avenue*; and 16 *Vesey street*.  
 1856 Townsend, Randolph W. *New York Hotel*; and 140 *Broadway*.  
 1859 Tracy, Charles. 81 *East Seventeenth street*; and 18 *William street*.  
 1856 Tremain, Edwin R. 180 *East Thirteenth street*.  
 1856 Trenor, John. 1 *University Place*.  
 1859 Trow, John F. 92 *East Sixteenth street*; and 50 *Greene street*.  
 1859 Turney, Paschal W. 60 *West Tenth street*; and 110 *Broadway*.  
  
 1859 Underhill, Walter. 19 *East Twenty-fifth street*; and 48 *Wall street*.  
  
 1857 Van Blarcom, John A. *Brooklyn*; and 81 *Fulton street*.  
 1856 Vandervoort, Peter H. 80 *Ninth street*; and 243 *Water street*.  
 1859 500 Varnum, Joseph B., Jr. 21 *Washington Square*; and 110 *Broadway*.  
 1859 Verplanck, Gulian Crommelin, LL.D. 12 *Union Place*; and *Castle Garden*.  
 1854 Viele, Egbert L. 38 *West Twenty-fourth street*; and 13 *Broadway*.  
 1856 Vincent, Edward. 106 *Bleecker street*; and 10 *Broad street*.  
  
 1854 Waddell, William Coventry, H. *Society Library, University Place*.  
 1859 Wainwright, John Howard. 37 *William street*.  
 1856 Walke, Cornelius, M.D. 213 *Second Avenue*.  
 1859 Walsh, Alexander R. 80 *Clinton Place*; and 211 *Pearl street*.  
 1854 Ward, Augustus H. 14 *Washington Place*.  
 1859 \*Ward George C. *Staten Island*; and 56 *Wall street*.  
 1859 510 Ward, Thomas, M.D. 80 *University Place*.  
 1856 Warren, James K. 32 *West Twenty-third street*; and 65 *Wall street*.  
 1856 Waterbury, Lawrence. *Throg's Neck, Westchester County, New York*; and  
 253 *Front street*.  
 1859 Watson, William H., M.D. 44 *West Twenty-third street*.  
 1853 \*Watts, Ridley. 27 *East Twentieth street*; and 87 *South street*.  
 1854 Watts, Robert, M.D. 42 *East Twelfth street*.  
 1854 Webb, William H. 72 *St. Mark's Place*; and *Sixth street, East River*.  
 1856 Weed, Ebenezer S. 98 *Third street, Brooklyn*; and 29 *Ferry street*.  
 1856 Wells, Jacob. *Brooklyn*; and 21 *Murray street*.  
 1856 Westermann, Bernard. 440 *Broadway*.  
 1859 520 Weston, Rev. Sullivan H. 193 *Hudson street*.  
 1856 Wetmore, David. 94 *East Thirtieth street*; and 81 *Vesey street*.  
 1854 Wetmore, Samuel. 15 *Waverley Place*; and 56 *Wall street*.  
 1856 Wheatley, Charles M. 9 *Bleecker street*.

Year of  
Election.

- 1855 Wheeler, David E. 148 *Fifth Avenue*; and 237 *Broadway*.  
 1856 White, John H. 32 *West Thirty-fifth street*; and 169 *Broadway*.  
 1856 White, Ezra. 18 *West Sixteenth street*; and 61 *Wall street*.  
 1856 Whitlock, Benjamin M. 18 *Beekman street*.  
 1859 Willis, Richard Storrs. 12 *East Twenty-ninth street*; and 379 *Broadway*.  
 1857 Wilson, Harris. 8 *St. Mark's Place*; and 31 *Nassau street*.  
 1860 530 Winston, Frederick S. 10 *East Thirty-fourth street*; and 94 *Broadway*.  
 1856 Winthrop, Benjamin R. 134 *Second Avenue*; and 10 *Wall street*.  
 1859 \*Withers, Reuben. 135 *Second Avenue*; and 35 *William street*.  
 1854 \*Witthaus, Gustavus H. 151 *East Fourteenth street*; and 34 *Barclay street*.  
 1854 \*Witthaus, Rudolph A. 86 *Second Avenue*; and 34 *Barclay street*.  
 1859 \*Wolfe, John David. 13 *Madison Avenue*; and 53 *Walker street*.  
 1856 Wood, Rev. Augustus A. 63 *Amity street*.  
 1856 Wood, Hon. Fernando, Mayor of New York. *City Hall*.  
 1857 Wood, Isaac, M.D. 63 *East Seventeenth street*.  
 1860 Woodward, George F., M.D. 2 *Irving Place*.  
 1859 540 Woodward Samuel. 16 *Seventh Avenue*; and 325 *Fourth street*.  
 1859 Worth, Francis W. 131 *West Twenty-third street*; and 52 *Wall street*.  
 1856 Wright, William W. 104 *West Twenty-first street*; and 252 *Broadway*.  
 1852 Wyman, Luther B. *Brooklyn*; and 38 *Burling Slip*.  
 1859 Young, William. 18 *Beekman street*.

## JOURNAL OF THE AMERICAN GEOGRAPHICAL AND STATISTICAL SOCIETY.

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I.—*The Progress of Marine Geography. Compiled by the  
GENERAL SECRETARY from data furnished by the Hydro-  
graphical Office, Washington.*

Communicated February 25, 1860.

It has been now about eighteen years since the first Wind and Current Charts were projected in manuscript at the Hydrographical Office of Washington. One of the earliest laborers in this work was a brave, gallant, and noble officer,\* who was destined afterwards to grace disaster, and make shipwreck glorious. The labors thus commenced there, and the researches connected with them, have led to the establishment of what Humboldt termed a new department in science, viz., the Physical Geography of the Sea.

It is the object of this writing to give some account of the progress which has recently been made in this new department of Geography.

The Maritime Conference of Brussels gave it encouragement, and did much towards procuring laborers for the field thus opened; all who have entered it are daily gathering from it the most precious fruits. These being winnowed at the proper office in Holland, or in London, or in Paris, or in Washington, or elsewhere, and prepared for every-day use at sea, are thence distributed without cost to all navigators who will unite in collecting more data of the same sort. To this system of research we owe the discovery of the Telegraphic Plateau, and all the knowledge that the world possesses concerning the ooze and bottom of the *deep* sea.

Nor are these by any means the only or the most valuable results to which the investigations connected with the procuring of data for mapping out the winds and currents of the ocean, have led.

It is supposed that the reader is acquainted with the gen-

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\* Lieut. WM. LEWIS HERNDON, of the U. S. Mail Steamship *Central America*.

eral results already obtained and published. It is proposed, therefore, only to allude here to some of the most prominent works that have been accomplished or undertaken within this field during the past year.

The Austrian Frigate *Novara*, having been recalled by the war in Italy, returned to Trieste in August last, from her most noble mission, which she had undertaken under the patronage of H. I. R. Highness, the Archduke Ferdinand Maximilian. She sailed in April, 1857, on a voyage of scientific exploration around the world. Furnished with all the means and appliances that princely munificence, stimulated by enlightened views, and by an earnest desire to increase knowledge concerning our planet, could call forth, she visited twenty-one ports, and sailed upwards of 60,000 miles. The results are now being prepared for publication.

Though under the Austrian flag, this Expedition was dedicated to the service of all, for it was undertaken for the advancement of human knowledge in its largest sense. Its fruits, like the fruits of that volunteer system of research at sea, in which men-of-war and merchantmen of all flags have for the last five years been engaged, are considered the property of the world; and that they may be within convenient reach of all people, they are to be published, by order of its illustrious patron, in divers languages.

The nautical part, comprising Astronomy, Magnetism, Meteorology, and things pertaining to the physical geography of the sea, is to be published under the immediate control of Commodore Wüllerstorff, the commander of the expedition. Messrs. Frauenfeld and Zelebor have charge of the zoological part of the expedition, Dr. Hochstetter of the geological, Dr. Schwarz of the botanical and medical, and Dr. Scherzer\* of the ethnographical, commercial, and statistical department. The last named savant is also charged with the history of the expedition, which is immediately to be prepared and published in a popular style.

The specimens collected by the *Novara* from the various departments of natural history are very extensive, and one of the imperial palaces in Vienna has been set apart for their accommodation. Next to the late Dr. Morton's in Philadelphia, and Blumenbach's in Gottingen, the *Novara* is said to have made the most valuable collection of human skulls in the world

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\* Dr. S. requests that persons in this country interested in his specialty, will send him statistics. They should be sent to the care of the Academy of Science, Vienna.



During this cruise, Commodore Wüllerstorff has suggested the use of the Aneroid Barometer, in connection with the mercurial, for the determination of the figure and density of the earth. As the one acts by gravity alone, and the other independently of gravity, the observations consist merely in noting the difference on various parallels in the reading of two delicately constructed and nicely adjusted instruments of the dry and fluid sort.

Confining our remarks to barometers as *at present* constructed, this method, with its results, is not entitled to the weight due other and more elaborate methods; yet, owing to its simplicity, and the facility of putting it to practice, it is not without advantages; for by it, the effect of mountain masses on gravitation towards the centre of the earth, may be measured. In other words, the suggestion of the Austrian Commodore to use the Aneroid for the figure of the earth, being expanded, has placed in our hands a balance in which mountains may be weighed.

Differential thermo-barometers, after the plan of Tate, for example, would, perhaps, give better results than the Aneroid in its present state is capable of yielding. The Aneroid barometer is an instrument, the use of which, except merely as a "hack," is not to be encouraged, or trusted.

Prussia has entered this field of research not only with her commercial, but with her military marine also. She has now at sea, on its way to China, Japan, and Siam, a squadron of three vessels. It consists of the Corvette *Arcona* (screw), the Frigate *Thetis*, and the Schooner *Frauenlob*, under the command of Commodore Sundewall. Its immediate object is to extend commerce, and consequently to increase geographical knowledge. The flag it bears is a sure guarantee to the world that that Expedition is not to return to the friends of science, which means the whole state of Christendom, empty-handed from such a field.

The last year, with its events, has returned to his country and friends the last Arctic explorer. The little *Fox*, with her gallant crew, has lifted the veil which so long shrouded the fate of Franklin and his companions. They found records telling when and where their ships were abandoned. Without doubt the whole party has perished. Sir John Franklin died a natural death June the 11th, 1847, and Captain Crozier with the surviving officers and men, numbering 105, all told, abandoned their ships on the 22d day of April, 1848, off King William Island. Many relics were found, and there seems

now to be little doubt but that he and his companions, striving to make their way south, perished with starvation by hunger and cold.

An account of this interesting cruise has been published by Captain McClintock,\* to whom the students of Arctic geography are much indebted, for he has made valuable contributions to our knowledge concerning those regions.

The *Fox* accomplished another of those remarkable drifts which can be explained upon no other hypothesis but that of an open water in the Arctic ocean, and not far from the entrance into it of some of the channels which connect it with Baffin's Bay on the Polar side of  $75^{\circ}$ . The *Fox* was attempting to pass from Melville Bay over to Lancaster Sound in August, 1857, when, on the 18th day of that month she fell in with ice, in which she was finally frozen up, and remained so for 242 days, during which time she was drifted to the southward 1,194 miles, which gives an average rate of five miles a day.

This drift, the drift of the *Resolute*, of the *Advance*, and *Rescue*, each of a thousand miles or more, appear to indicate that a similar drift takes place every year. They show the existence of a *Polynia*, and indicate that the open sea is to be sought for at no great distance from Kennedy's channel on the one hand, and Maury's on the other. This conclusion is reached by a process of reasoning, of this sort :—

When each one of these vessels was released from her cold fetters, there was, doubtless, behind her and between her place of release and her place of original imprisonment, an uninterrupted reach of a thousand miles covered with ice, which ice, during the fall, the winter, and early spring, drifted out of the Arctic ocean. Now we have the choice of two suppositions, and of only two, in explanation of this phenomenon, and they are : Either that the great body of all the winter-formed ice of the Arctic ocean must have drifted in an unbroken mass over towards Baffin's Bay ; for these vessels were brought out upon a tongue of ice thrust through that bay down into Davis' Straits ; or, second, that this tongue must have been separated from the main mass, leaving that behind while it drifted out.

By the latter supposition, all the known facts of the case may be reconciled ; by the former, not one.

\* The voyage of the *Fox* in the Arctic seas. Discovery of the fate of Sir John Franklin and his companions. By Capt. F. L. McCLINTOCK, R. N. Murray, London. 1859.

If we suppose this drifting field of ice to be formed upon the very verge of an open sea, and to drift to the south as fast as it is formed, then the whole phenomenon becomes one of easy solution. At any rate, we are now possessed of a physical fact, which probably would have returned Captain Crozier and his companions to us all safe and sound, had they been aware of its existence—and that fact is in this oft-occurring, if not regular and annual, southward drift of ice from the Arctic ocean, down through Baffin's Bay into Davis' Straits. Captain Franklin being ignorant of it, placed his vessels out of its reach on the south, where he was frozen in and died, and where Capt. Crozier, his successor, remained imprisoned for eighteen months, and then abandoned his ships; their drift in the mean time, and for obvious reasons, being almost, if not quite, insensible, except as influenced by the summer thaw. Now, if those vessels, with their scurvy-riddled, frost-worn, and disabled crews, could have been placed further to the North, as in Barrow Straits, or in the "fair way" of any of those channels connecting with it from the Northward and Westward, or with Baffin's Bay, the probabilities are that this regular recurring winter drift would have brought them down safely into milder climates, and into the glad waters of the Atlantic ocean, as it did the crews of those other vessels.

The frequent, if not regular annual occurrence of this winter drift down through Baffin's Bay, is a fact which will be considered by all future Arctic explorers as one of great importance, for it affords the means of escaping from the Arctic ocean in the severest winter.

The Meteorological Department of the Board of Trade—Admiral Fitz Roy—is an office established in London for the purpose of co-operating with Lieut. Maury in the physical researches of the sea. Through it, the British government has caused to be undertaken a regular series of meteorological observations in and around the Atlantic ocean. Self-registering anemometers have been placed at Halifax and Bermuda; the series was commenced last summer. Many amateurs in the United States are taking part in it; and the Secretary of the Treasury, with the true liberality of enlightened statesmanship, has authorized the requisite observations to be made at all the light-houses on the Atlantic seaboard.

This series of observations has been undertaken at the instance of the Royal Society, and the British Association for the Advancement of Science. The object of it is to investigate more closely "the laws of storms, winds of all kinds, and general

circulation or changes of our atmosphere." \* The series will terminate next fall, and from it we are entitled to anticipate valuable contributions to the physical geography of the sea, and much information of immediate value to commerce and navigation.

As long ago as 1851, we find the Superintendent of the National Observatory at Washington, urging the extension to the land, for the benefit of farmers, the shipping in our ports, and the industrial pursuits of the country generally, of that system of meteorological co-operation and research which has been so signally beneficial to commerce and navigation at sea. The Brussels Conference endorsed this recommendation. Much stress in these appeals to Congress and the people has been laid upon the value of the magnetic Telegraph as a meteorological implement: for it was held that by a properly managed system of daily weather reports by telegraph, warnings of many, if not most of the destructive storms which visit our shores or sweep over the land, might be given sufficiently in advance to prevent shipwreck, with many other losses, disasters, and inconveniences to both man and beast.

At the last meeting (in Aberdeen) of the British Association, a Committee was appointed to memorialize their government in behalf of a system of telegraphic meteorology for the realm.

The actual observations of the day have since shown, that had such a system been in vogue at the time, warning might have been sent to Queenstown, with orders to detain the ill-fated Royal Charter there, until the storm in which she, with a large amount of treasure and hundreds of precious lives, was lost, had passed over. She put to sea from Queenstown, where she touched to land passengers, on the afternoon of October the 25th, when the storm which she was destined to meet that evening and to perish in, had already burst upon England.

Admiral Fitz Roy has already been consulted as to details. Preliminary steps have been taken, and it is hoped that we shall soon see this admirable and benign system of applied science in successful operation on the other side of the Atlantic at least. Success there will doubtless lead to the establishment of a like plan here.

But of all the co-operators in this system of research touching the winds and currents of the sea, none are more active and diligent, nor have any rendered better services than the Dutch,

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\* Admiral Fitz Roy's circular letter.

through the Royal Meteorological Institute of Utrecht. Jansen, Van Gogh, and Andrau, Lieutenants all, by their labors there, on the route to India, have mapped out the winds and currents of the seas through which India-men under canvas have to plow their way. They have pointed out so clearly how time may be saved by going round adverse winds here, and taking advantage of propitious currents there, that the average time of the voyage has been quickened ten per cent.

The last contribution from that office, to the general stock of nautical information is a quarto pamphlet of 80 pages, illustrated with plates, published a few months ago, on the homeward voyage to India.\*

In it are given the results of 83,334 observations on the height of the barometer at sea, between the parallels of 50° N. and 36° S. They are so treated as to show at a glance the mean height of the barometer for every wind at any intervening latitude.

Lieutenant Andrau has placed the commercial world under lasting obligations by the masterly discussion, in this publication, of the gales which have won for the Cape of Good Hope the "Stormy" epithet, and which have made the doubling of it often difficult and sometimes dangerous.

There is, it appears, off this Cape, and near the Lagulhas Banks, a lake—a sea, of warm water, into which the Mozambique current discharges itself. Over this sea the storm king broods. Lieutenant Andrau has shown that here is the centre of the stormy region off the Cape; that the gales of wind as soon as they arise in the surrounding regions, make for this cauldron of steaming water; that they are warded off from the land by an invisible power; and that there is between those banks and the shore a region, for the most part stormless, through which vessels may sail with pleasant breezes and fine weather, while others a few miles to the south and almost in sight, are buffeting with the most furious gales.

Lieutenant Andrau and his colleague Lieutenant Bowier are now preparing, in two sheets, a general chart of the winds at sea.

A Bureau of co-operation has been organized in Paris, under the superintendence of Captain De la Marche of the Corps of Hydrographic Engineers, in Portugal under Doctor G.

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\* "Maandelijksche Zeilaanwijzingen van Java naar het Kanaal. Als Uitkomsten van Wetenschap en Ervaring aangaande Winden en Zeestroomingen in sommige Gedeelten van den Oceaan. Uitgegeven door het Koninklijk Nederlandsch Meteorologisch Instituut. Utrecht. L. E. Bosch en Zoor, 1859.

J. A. D. Pegado of the Polytechnic school who has been succeeded by Lieutenant João Carlos Brito Capello,—and in Spain under Don José Sanchez Cerquero, F.R.S., &c., Director of the Royal Observatory of San Fernando.

By order of the French Emperor, Lieut. Vanéechout has translated Maury's Sailing Directions, and it has been published by the Department "Marine Imperiale," for the benefit of French commerce and navigation.

During the last month, M. Félix Julien, an élève of the Polytechnic School, and a Lieutenant de Vaisseau in the French Navy, has made a valuable contribution to physico-geographical and nautical science in the shape of a work on the sea and air.\* This work is of that class which, in many of the departments of physical research, has done so much for the true interests of science, viz.: it is of the popular sort, having for its object to place before the reader an account, in attractive style and free of technicalities, of the recent progress in that branch of science to which its subject belongs. It partakes therefore, necessarily, of the nature of a compilation, and, as a whole, is entitled to be mentioned, not only as an instance of successful welding together of various facts into one homogeneous and highly interesting dissertation, but also as imparting fresh interest to this system of research.

In his chapter on the revolutions of the sea, the author calls attention to the generally admitted fact that the southern hemisphere is colder than the northern, and after alluding to erroneous hypotheses which have been proposed to account for the fact, aims at the *vera causa* by a discussion of the earth's elliptic motion around the sun. We know, he maintains, from astronomy, that the earth occupies a longer time in passing through that half of its orbit which corresponds to Spring and Summer in the northern, to Autumn and Winter in the southern, hemisphere, than through the other half. The difference of time is small, but its effect is cumulative, and seems sufficient, in the opinion of Lieut. Julien, to account for the fact in question. Now, the earth being originally equilibrated, north and south, he maintains there will be, in consequence of this difference of temperature, an excessive accumulation of ice formed, in the course of ages, around

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\* Courants et Révolutions de l'Atmosphère et de la Mer, comprenant une Théorie nouvelle sur les Déluges Périodiques. Par FELIX JULIEN, Lieutenant de Vaisseau, ancien élève de l'Ecole Polytechnique. Paris: Librairie Scientifique, Industrielle et Agricole. Lacroix et Baudry: Réunion de l'ancienne Maison Matheas et du Comp-toir des Imprimeurs. 1860.

the southern pole, the final effect of which will be, he thinks, destructive of the original equilibrium—the centre of gravity being now south of the equator—and a deluging flow of the waters of the ocean in the same direction, leaving, as we now find it, a preponderance of land in the northern hemisphere.

But, by reason of precession of equinoxes, the resulting state of things will not be permanent. After some 10,000 or 11,000 years, the relations of seasons in the two hemispheres will be reversed: the northern will be the colder; ice will most accumulate there, and finally the centre of gravity, and the waters with it, will move thitherward, causing another deluging wave, to be followed in its turn by an endless series of similar recurrences, each working its mighty changes upon the surface of our globe.

Such is the theory of cataclysms, as propounded by a very clever writer, and to which reference is made as a matter of history, but without any design to commit the pages of this journal to it.

But perhaps the most remarkable undertaking of the year, in connection with these studies of sea and air, is that of Admiral Chabannes, in command of the French fleet on the coast of Brazil. It is a most gratifying instance of the zeal, energy, and intelligence with which officers under other flags have united with us as colleagues and fellow-laborers in this beautiful system of research. Among the various duties of a commanding officer in such a position, and in the midst of the multitudinous calls upon him, that distinguished Admiral has nevertheless found time to overhaul all the log-books of the Brazilian navy for the last 25 years, kindly placed at his disposal by command of His Majesty, for the purpose of procuring data to assist him in co-ordinating the winds along the coast of Brazil, on a scale larger and more comprehensive than any hitherto attempted. The results that await him will instruct us in the climates of Brazil, as well as in the safe and speedy navigation along its coasts. They are to be published in pamphlet form, and as Tables "Indicating the prevailing winds for each month, and for every square of one degree of latitude, on the Eastern Coast of South America, and forming a supplement to Maury's Charts."

During the last year the 8th edition of Maury's Sailing Directions, in two quarto volumes, has been published at the Observatory in Washington. It affords abundant evidence of the activity, to which allusion has already been made, in this



field of research, and with regard to which all geographers feel the most lively interest.

Official tables have been received from San Francisco, showing the vessels that have arrived at that port during the year, with the length of passage. Of those arriving direct, *viâ* Cape Horn, 124 were from the Atlantic ports of the United States, and 34 from Europe. Of these 124, 70 are known to have had the Wind and Current Charts on board; their average passage was 135 days, which is 11 days less than the average of those from the United States, and 24 days less than the average of those from Europe, *without the Charts*. When these researches commenced, the general average was 180 days from the United States, and 183 from Europe, to California.

Maury's Monograph, No. 1, a 4to pamphlet of 8 pp. and 4 plates, "On the Winds at Sea," is, excepting the Monsoon Chart of the Indian Ocean, the latest publication from that Bureau. It gives the mean direction and average annual duration of the winds, as determined in various parts of the ocean, from the results of 1,213,930 separate observations.

Using these figures, the 83,334 barometric observations obtained from the Dutch logs by Lieut. Andrau; the 6,000 observations south of the parallel of  $40^{\circ}$  S., obtained from the log-books of the Observatory; the observations of Sir James Clark Ross in high southern latitudes; Dr. Kane's in the Arctic Ocean; besides various others near the sea-shore, as those at Greenwich, St. Petersburg, Hobart Town, &c., and making upwards of 100,000 in all, the annexed diagram of the winds and barometric profile of the atmosphere has been constructed. It develops the important discovery that the atmosphere, as well as the land and water, is unequally divided between the two hemispheres.

The arrows *within* the circle fly with the wind. They represent its mean annual direction from each quarter, and by bands  $5^{\circ}$  of latitude in breadth, and according to actual observation at sea. They show by their length the annual duration of the wind in months. They are on a scale of  $\frac{1}{2}$  of an inch per month, except the half-bearded arrows which are on a scale twice as great, or  $\frac{1}{16}$  of an inch to the month. It will thus be perceived at a glance that the winds of the longest duration are the S. E. trades between the parallels of  $5^{\circ}$  and  $10^{\circ}$  South, where the long feathered arrows represent an annual average of ten months.

The most prevalent winds in each band are represented by



full-feathered arrows ; the next by half-feathered—except between the parallels of  $30^{\circ}$  and  $35^{\circ}$  N.—where the N. E. and S. W. winds, and between the parallels of  $35^{\circ}$  and  $40^{\circ}$  S., where the N. W. and S. W. winds, contend for the mastery as to average annual duration.

The rows of arrows on each side of the axis and nearest to it, are projected with the utmost care as to direction, and length or duration.

The feathered arrows in the shading around the circle represent the crossing at the calm belts, and the great equatorial and polar movements by upper and lower currents of the air, in its general system of atmospherical circulation as described by Maury in his "*Physical Geography of the Sea*"—from a new edition of which work now in the course of preparation, this plate is borrowed.

The small featherless and curved arrows in the shading around the circle show how the trade winds as they cross parallels of larger and larger circumference on their way to the Equator, act as an undertow, and draw supplies of pure air down from the counter current above ; which supplies are required to satisfy the increasing demands of these winds, for as they near the Equator they not only cross parallels of larger circumference, but as actual observation show, they also greatly increase both their duration and velocity. In like manner, the counter trades as they approach the poles are going from latitudes where the parallels are larger to latitudes where the parallels are smaller. In other words, they diminish, as they approach the poles, the area of their vertical section ; consequently, there is a crowding out—a sloughing off from the lower current, and a joining and a turning back with the upper current. This phenomenon is represented by the small featherless and curved arrows in the periphery on the polar side of the calm belts of Cancer and Capricorn.

This dotted or shaded periphery is intended to represent a profile view of the atmosphere, as suggested by the readings of the barometer at sea. This method of delineating the atmosphere is resorted to in order to show the unequal distribution of the atmosphere, particularly on the polar side of lat.  $40^{\circ}$  south ; also, the piling up over the calm belt, and the depression—barometrical—over the Equatorial calms and cloud ring.

The engirdling seas of the extra-tropical south suggest at once the cause of this inequality in the arrangement over them of the airy covering of our planet. Excepting a small portion of South America, the belt between the parallels of  $40^{\circ}$  and  $65^{\circ}$

or 70° south may be considered to consist entirely of sea. This immense area of water surface keeps the atmosphere continually saturated with vapor. The specific gravity of common atmospheric air being taken as unity, that of aqueous vapor is about 06; consequently, the atmosphere is expelled thence by the *steam* if, for the sake of explanation, we may so call the vapor which is continually rising up from this immense boiler. This vapor displaces a certain portion of air, occupies its place, and being one-third lighter, also makes lighter the barometric column. Moreover, being lighter it mounts up into the cloud region, where it is condensed either into clouds or rain; and the latent heat that is set free in the process assists still further to lessen the barometric column, and to modify the South polar climate; for the heat thus liberated warms and expands the upper air, causing it to swell out above its proper level and so flow back towards the Equator with the upper current of these regions.

Thus, though the barometer stands so low as to show that there is less atmosphere over high southern latitudes than there is in corresponding latitudes north—yet if it were visible and we could see it, we should discover, owing to the effect of this vapor and the liberation of its latent heat, and the resulting intumescence of the lighter air over the Austral regions—the actual height of this invisible covering to be higher there than it is in the Boreal regions.

Taking the mean height of the barometer for the Northern hemisphere to be 30 inches, and taking the 100,000 barometric observations used as data for the construction of this diagram to be correct, we have facts for the assertion that in the Austral regions, the quantity of air that this vapor permanently expels thence, is from  $\frac{1}{12}$  to  $\frac{1}{15}$  of the whole quantity that belongs to corresponding latitudes north. A curious, most interesting, and suggestive physical discovery.

Nor is this all. If the rarefaction in the Antarctic place of Polar calms be such as to reduce the mean height of the barometer there to about 28.1 in. as these observations indicate it is, must not the heat which produces such a degree of rarefaction of the upper air, be felt at the surface also, making the climate there comparatively mild and soft? In this view, these facts are trumpet-tongued in favor of an expedition to the eight millions of unexplored square miles in the Antarctic regions.

II.—*Geographical notice of the Coast Survey operations during the year 1859.* By Professor ALEXANDER DALLAS BACHE, LL.D., HON. MEM. A.G.S.S., Superintendent of the United States Coast Survey.

Communicated January 2d, 1860.

DURING the surveying year, ending Nov. 1st, 1859, the operations of the Survey have been in progress in its land-work, hydrographical and office-work in the twenty-two seaboard States and Territories of the United States, in which it is not essentially completed. It is well known that for the immediate purposes of the Survey, the coast is divided into eleven sections, beginning with No. 1, at the North-eastern boundary and terminating with No. 9, at the Southern boundary of Texas, including the Atlantic and Gulf coast. Sections 10 and 11 include the Western coast. The former begins at San Diego, and terminates at the 42d parallel, the latter terminates at the 49th parallel of latitude.

SEC. I. *Coast of the States of Maine, New Hampshire, Massachusetts, and Rhode Island.*

The primary triangulation has been carried to the North-eastern boundary of the U. S., Howard Mountain near Machias, and Western (Ridge Cooper,) having been occupied during the season. Observations for latitude and azimuth, and for the magnetic elements have been made at the same stations, and the base on Epping Plains has been connected with the triangulation.

Chamcook has been occupied for the triangulation of Passamaquoddy bay and the St. Croix. The secondary triangulation has been continued in Penobscot bay, and connected with that extending southward and westward over Muscongus bay to Damariscotta river. The topography of Wiscasset bay has been completed, and progress made in that of the Sheepscot river. The plane table survey of the Kennebec river and Merrymeeting bay, has been nearly completed, and that of Casco bay has been extended eastward nearly to Harpswell. That of Cape Cod bay has been extended east and west, including the shores of Barnstable harbor, Mass., and verification of the topography done in the section is now in progress. The hydrography has been extended from Cape Newagen and Damiscove island, to Cape Small Point outside of Kennebec entrance, and soundings have been made in Casco bay to join with former work abreast of and between Portland

light and Green island. The inshore hydrography has been extended from Cape Elizabeth to Kennebunkport, Maine, and soundings have been made within the Isles of Shoals, N. H. Deep sea-lines have been run from Cape Ann across Cashe's Ledge to Seal Island, N. S., and thence by traverses to Machias, Mt. Desert rock, Matinicus, and Manhegan island, to Portland entrance; and from Cape Elizabeth southward to Nausett Centre light, Cape Cod. The off-shore hydrography has been continued off the coast of Massachusetts.

Revision work has been done in Salem and Hyannis harbors, and work for the examination of changes in parts of Boston harbor. Special magnetic observations have been made at Portland, Me., Portsmouth, N. H., and at several stations on Cape Ann, Mass. The tidal observations at Boston harbor have been continued, and a tidal station has been established at Eastport, Me. Experiments with a new pressure tide gauge have been made at Charlestown, Mass.

SEC. II. *Coast of Connecticut, New York, New Jersey, Pennsylvania, and part of Delaware.*

The triangulation of the Hudson river has been extended from Hudson northward, to connect with the work from Albany southward, at New Baltimore, and additional points have been determined near Yonkers. The topography of the Hudson has been continued, with intervals, north from the former limit to near Sing Sing on the eastern shore, including the delineation of the Palisades; that of Harlem river has been completed, and that of Long Island, back of Brooklyn and Williamsburg, and in the vicinity of South Jamaica, has been filled in. The outlines of the new piers at Sand Point and Great Neck, have been traced. The hydrography of the Hudson river has been in progress from Newburgh north to Poughkeepsie. A resurvey has been made of the shoal off the Battery, New York city, for changes; Magnetic Stations have been occupied at Hartford, Conn., Springfield, Chesterfield, and Deerfield, Mass.; and at Rutland, Vt.; and minute current observations have been made off the western end of Long Island. Tidal observations have been continued at Brooklyn.

SEC. III. *Coast of Delaware, Maryland, and part of Virginia.*

The triangulation of the Potomac river has been extended from the mouth of the St. Mary's upwards, to the vicinity of Britton's bay; that of the James river has been completed by work at Hampton Roads, and a base measured near Claremont for verifying the triangulation of the upper James river, and

of the Appomattox. The topography of the outer coast of Maryland has been continued, and that of the shores of Chincoteague bay completed. The shore line of the Patuxent has been traced from Holland's Point to Hall's creek, and that of the St. Mary's, Md., from its entrance upwards to Warehouse Point, nearly completing the preliminary survey of those rivers. The shores of the James river have been traced between Westover and Little Brandon, completing the preliminary survey. The topography of the western shore of Chesapeake bay, between Rappahannock river and Mobjack bay, has been nearly completed. Soundings have been nearly completed in the Patuxent and St. Mary's rivers, and entirely in the James river and the Big and Little Annemessex, dependencies of Tangier sound. Observations with self-registering tide-gauges, have been kept up at the Washington Navy Yard, and at Old Point Comfort.

SEC. IV. *Part of the coast of Virginia and of North Carolina.*

The primary triangulation over Pamlico Sound has been commenced. The triangulation of verification near New Inlet, Cape Fear, has been continued. The topography of the coast of Virginia, between Currituck Sound and Cape Henry, has been completed. Inshore hydrography on the coast of North Carolina, has been extended from Bogue Inlet, southward and westward, to New River Inlet, and lines of soundings run between Cape Henry and Cape Hatteras, and observations in the Gulf Stream made in the vicinity of Cape Lookout.

Comparative charts of the Cape Fear entrances, showing the changes from 1851 to 1858, and diagrams illustrating Gulf Stream explorations, have been drawn.

SEC. V. *Coast of part of North Carolina, and coast of South Carolina and Georgia.*

Astronomical and magnetic observations have been made at Cape Fear entrance, and the latitude, azimuth, and magnetic elements, have been determined at Port Royal station. The triangulation has been extended south and west from Shallotte inlet to the boundary between North and South Carolina, and the shoreline traced in connection with it; signals have been erected and lines prepared for extending the primary work south and west of the Edisto base; the triangulation of Beaufort, Chechessee, and Colleton rivers, S. C., has been made; and that from Sapelo base extended across Doboy and Altamaha entrances to St. Simon's sound. The topo-

graphy has been continued southward and westward from Shallotte inlet; the preliminary survey between St. Helena sound and Savannah river has included the shore lines of Port Royal Sound and the entrances of Beaufort, Broad, Chechessee, and Colleton rivers, and Calibogue sound. The topography of St. Catherine's Sound has been nearly completed. The hydrography has been continued inshore, from Cape Fear entrance to Tubbs' inlet, N. C., and the off-shore between Cape Fear and Charleston harbor. Soundings have been completed in Bull's bay, S. C., and a resurvey of Port Royal entrance has been made. The hydrography of the Chechessee and Colleton rivers, S. C., has been completed, and also that of Sapelo entrance and approaches. Tidal observations have been kept up in Charleston harbor.

#### SEC. VI. *Coast, reefs, and keys of Florida.*

The triangulation along the air-line, from Fernandina to Cedar keys, has been continued to Waldo station. A preliminary base has been measured near St. Augustine, and the triangulation has been carried north towards Diego Plains. A preliminary base has been measured at Indian river inlet, Fla., and signals erected for the triangulation north and south of Fort Capron. The triangulation of the inner keys has been extended eastward from Lignum Vitae to Pigeon key, Florida reef; and that of Charlotte harbor from Captiva Pass northward to Punta Gorda. The topography of the western shores of Key Biscayne and Cards sounds has been completed, as also on the western side of Key Largo, and the survey made of numerous keys between Lignum Vitae and Oyster keys. The topography of Charlotte harbor has been continued northward from the former limit to Boca Grande. The hydrography of the Florida reef has been continued from Eagle Cove to Coffin's Patches. The Gulf Stream has been explored through the Florida channel, and soundings made for depth and temperature in sections across it from Carysfort Lighthouse, Sombrero key, and the Tortugas. Tidal observations have been continued at St. Mary's river entrance, Tortugas, Charlotte harbor, and Egmont key (Tampa).

#### SEC. VII. *Part of the Western coast of Florida.*

The triangulation has been carried from Crystal reef southward, to the vicinity of Bayport; has been continued from St. George's Sound to St. Mark's harbor, and from Pensacola bay into Santa Rosa Sound. The topography has been continued nearly over the same limits. The hydrography has included a verification of the work at Cedar keys, and that at the eastern

entrance of St. George's Sound, including the new channel (Duer's) passing near Dog Island. Tidal observations have been kept up at Cedar keys, and at Warrington, Pensacola harbor.

SEC. VIII. *Coast of Alabama, Mississippi, and part of Louisiana.*

The triangulation of Isle au Breton sound has been continued southward to Point Fortuna; progress has been made in that of Pass à Loutre, the S. E. pass of the Mississippi and of Bay Rondo, and that of Côte Blanche bay, has been extended westward nearly to the entrance of Vermillion bay. The topography of the shores of Lake Pontchartrain has been continued, and that of Isle au Breton sound has nearly kept pace with the triangulation. The hydrography of Pass à Loutre has been executed and that of Atchafalaya and Côte Blanche bay East, completed. Some deep sea lines of soundings have been run in the Gulf of Mexico.

SEC. IX. *Coast of part of Louisiana, and coast of Texas.*

The triangulation has been carried from Matagorda entrance southward and eastward over Espiritu Santo, San Antonio, Aransas, and Copano bays, and their dependencies. The topography has been extended along the shores of Espiritu Santo and San Antonio bays, and part of Matagorda island. The hydrography of Matagorda bay has been completed between the city and Palacios Point.

SEC. X. *Coast of California.*

The primary triangulation in the vicinity of the San Pedro base, has been revised, and the secondary triangulation of San Pedro harbor executed; as also that of the northern part of Santa Rosa Island, Santa Barbara channel. The primary triangulation from San Francisco entrance has been extended northward to Sulphur Peak, and the secondary connected with it carried over Drake's bay and Point Reyes. The positions of the Farallones have been determined by triangulation. Crescent City harbor has been triangulated. The topography has included the harbor of San Pedro, part of Santa Cruz island, and Crescent City harbor. The hydrography of San Pedro harbor has been completed, and soundings off the approaches to the Golden Gate nearly so. A resurvey has been made of Humboldt bay, and the hydrography of Crescent City harbor executed. The regular tidal observations have been kept up at San Diego and near San Francisco.

SEC. XI. *Coast of Oregon, and that of Washington Territory.*



The triangulation of the Gulf of Georgia has been continued, stations on Point Roberts being connected with others on Galiano island above the forty-ninth parallel. Hydrographic reconnoissances have been made at the entrances to the Coquille river, Oregon, and at Gray's harbor, W. T., and general duty has been performed in connection with requirements of the commissioner on the North-western boundary. The regular tidal observations at Astoria have been continued.

The special developments and discoveries during the year may be summed up as follows :

1. Only eighteen feet at mean low water, found on the rock one mile to the southward of Seguin Island, coast of Maine.

2. True position of the Hussey Rock in Casco bay determined, correcting the erroneous one assigned on previous charts.

3. Determination of the position of the "Hue and Cry," the "Old Proprietor," and other dangers off Cape Elizabeth, Me.

4. Development of a rock off Ogunquit, bare at low tides and very little known.

5. A fishing bank sounded out, off Wood Island, coast of Maine.

6. Huzzey's Rock south of Fletcher's Neck, Me., determined in position.

7. Development of a four-fathom bank, off Cape Porpoise, Maine.

8. Determination of the position of a small rock with less than four feet at mean low water, near the channel, and in the vicinity of Great Rock, Hyannis harbor, Mass.

9. The existence of a seventeen foot spot on the shoal off the Battery, New York harbor, the extension of the shoal towards the channel, and the shoaling of the water generally, between the shoal and the shore.

10. The existence and character of sub-currents ascertained, as bearing on the physical conditions of New York harbor.

11. Changes developed in the shore lines at the entrance of Little Annemessex river, Chesapeake bay.

12. Less water found off Cape Roman by preliminary examination, than has been heretofore assigned.

13. Further explorations in developing the character of the Gulf Stream in the Florida channel.

Tide tables for navigators of the coast of the United States have been revised and additional results for the diurnal ine-



quality in the ports of the Pacific coast, have been interpolated. The table for depths of water for the various ports of the United States, has been revised. An additional list of geographical positions amounting to 1662 have been prepared for publication, making the total number 7173.

Valuable results in the laws of terrestrial magnetism, have been deduced from the Philadelphia observations between 1840 and 1845, and from a new discussion of the secular change of all the stations available on the sea coast of the United States.

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III.—*Some Account of the Lake of Yojoa, or Taulebé, in Honduras, Central America.*\* BY EPHRAIM GEORGE SQUIER, MEM. A.G.S.S.

Communicated January 5, 1860.

THE lakes of Central America are among its most interesting physical features, and, next to its volcanos, most likely to arrest the attention of the intelligent traveller. The large and beautiful lake of Nicaragua, the *Cocibolca* of the aborigines, and its dependent lake of Managua or Leon, the first one hundred and twenty, the second sixty miles in length, are those best known, principally on account of the facilities which they are supposed to offer, in connection with the projects of opening water communication between the Atlantic and Pacific oceans. After these, we are best acquainted with the volcanic lakes of Masaya in Nicaragua, Ilopango in San Salvador, and Amatitlan and Atitlan in Guatemala. The lake of Itza, often called Peten, in Vera Paz, remarkable for its historical associations, has lately been visited and described by an intelligent traveller, M. Morelet, and has thus been brought within the range of geographical knowledge. Like Atitlan in Guatemala, and Masaya in Nicaragua, it is without an outlet; but unlike them, betrays no evidence of volcanic origin. It is the closed reservoir, within which is collected the drainage of a considerable terrestrial basin, and, securing the waters of a number of streams, the Indians call it, not inappropriately, *Nohkuk'en*, rendered by the Spaniards, *Beber-mucho*, or "Drink-much."

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\* A translation of this paper, with a Map, was printed in Dr. Petermann's *Mittheilungen*, No. V., for 1859; but the original is now for the first time published.—Ed.

There is another Central American lake in Honduras, of which less has been known than of the "mysterious lake of Itza" itself. Although twenty-four miles in length, by eight miles broad, at its widest part, it never appeared on any map of Central America, before that of Bailey, published in 1850. This circumstance will indicate, in some degree, the imperfect state of our geographical knowledge of the country, prior to that date, and which, I am sorry to add, has not greatly improved since then. This lake lies about seventy-five miles to the southward of the Bay of Honduras, between lat.  $14^{\circ} 38'$  and  $15^{\circ} 3' N.$ , and long.  $88^{\circ} 2'$  and  $88^{\circ} 13' W.$  And while Itza is distinguished as having no outlet, Yojoa or Taulebé, the lake in question, is equally remarkable from having several outlets. These are said to be ten in number, one only being open, the others subterranean. In Bailey's map it is represented as having five, all open.

Our present information respecting this lake, although still incomplete, is derived from observations made in the month of February, 1858, by Lieut. Col. Edward Stanton, R. E., and the corps under his orders, sent out by H. B. M.'s Government, to verify the surveys for the projected Inter-oceanic Railway through Honduras, and from the examinations of Amory Edwards, Esq., of New York, who accompanied Col. Stanton, and who afterwards, in July, 1858, made a second and longer visit to the lake, for the purpose of determining the truth of the popular stories regarding its extraordinary features.

As I have said, Lake Yojoa is about twenty-five miles long by from five to eight broad, with an average depth of from eighteen to twenty-four feet. And although distant but forty-five miles from the sea, it has an elevation above the sea level, determined barometrically, of 2050 feet. It occupies the centre of one of those singular terrestrial basins, of which Honduras offers so many examples, called not inappropriately, *bolsones*, or pockets. These are formed by the contortions of the mountain system of the country, the ranges of which, so far from shooting out in relatively right lines, bend back on themselves, sometimes describing almost complete circles and enclosing plains of varying elevations and sizes. Here the waters of the surrounding mountain rivulets are collected, often forming considerable rivers, which generally wind away to the sea through the narrow valleys which pierce the apparently unbroken mountain ranges that shut in these elevated plains. But sometimes they burst through the rocky barriers which

impede their course, and after flowing for a while through deep *cañons*, between high cliffs, descend finally, by a series of rapids and plunging cataracts, to the level of the coast alluvions, where, uniting with other rivers of equally turbulent birth, they flow away, silently and majestically, through vast desert solitudes, to the ocean.

The high plains, or *bolsones* of Intibucah, Sensente, Otoro, Coruajagua, Tegucigalpa, Olancho, and numerous others of inferior importance, answer to this description. At some period, more or less remote, it is easy to believe that most, if not all of these, were mountain-lakes or reservoirs, which were gradually drained by the slow excavations of their outlets, or suddenly liberated from their imprisonment by some convulsion of nature. Evidences of such an origin are not wanting; but their enumeration is foreign to the purpose in hand.

The lake of Yojoa occupies precisely one of the mountain-basins or *bolsones*, to which I have alluded, formed by the lapping or coiling round of the true Cordilleras or dividing ridge of the continent, which, in Honduras, constitutes a singular knot of mountains, known, in its various parts, by the different names of Merendon, Lelaque, Opolaca, San Juan, Monticillos, Miambar, and Santa Barbara mountains. It is, however, between the mountains of Miambar on the South and East, and those of Santa Barbara on the North and West, that the lake is situated. These have an average elevation of about 5,000 feet above the sea, or about 3,000 feet above the surface of the lake, which they shut in closely, leaving only narrow belts of marshy land near the water, which are for the most part overflowed when the lake is full. The slopes of both ranges of mountains on the side of the lake are abrupt: not generally available for agriculture, and only here and there used for cattle-ranges. The western slopes of the Santa Barbara mountains are nevertheless comparatively gentle, as also are the eastern slopes of the Miambar mountains. Both slopes descend towards the rivers Humuya and Santa Barbara respectively, by a series of terraces, intersected by numerous streams, flowing in deep and narrow valleys. A number of these streams, it will be seen as we proceed, take their rise in the lake, whence they are fed by subterranean channels.

The lake has but one open outlet, the river Jaitique, at its southern extremity, which in dry seasons is itself dry, but which generally has sufficient water to admit of the passage of canoes. It flows from the lake through a low meadow for upwards of a mile, then enters a narrow valley, amongst the hills

which connect the mountains of Santa Barbara and Miambar, and, describing a semicircle in its course, descends rapidly into the river Santa Barbara. Before reaching it, however, it receives the united waters of two streams, called the Rio Sacapa and the Rio Salala, both connecting with the lake by subterranean channels. The underground passage of the Sacapa is half a mile long, commencing about two miles from the lake, for which distance, like the Jaitique, this stream flows through a low meadow covered with rushes and coarse grass.

In regard to these streams, as well as in relation to the remaining outlets of the lake, I cannot do better than subjoin the account of Mr. Edwards, contained in his private itinerary, communicated to me in August, 1858 :

"On the 7th of February, 1858, when I visited Lake Yojoa in company with Col. Stanton, the river Jaitique, the principal and only open outlet of the lake, was full at Rancho del Toro, the place of embarkation, being not less than seven feet deep. On the 9th of May following, the period of my second visit, I found the river at the same point dry; the lake having fallen eight feet in the interval. I was informed that within the preceding week the lake had risen a few inches, in consequence of several night-showers, the occurrence of which indicated the commencement of the rainy season.

"Proceeding to the village of Sacapa, on the river of the same name, I obtained a guide and followed up the stream for a mile, to its point of emergence from its subterranean channel. I found the water *bulging up* from an orifice in the lime rock, near the base of a hill, not steep on the side of approach, covered with tropical vegetation. Groups of tall bamboos, the roots of which are nourished by the gushing waters, droop over the orifice, which is about twenty yards across. The stream falls rapidly from this source, descending two hundred feet in a quarter of a mile. A mile below, it is fifty feet broad, and between two and three feet deep. The amount of water is not augmented during the rainy season when the lake is full; a circumstance which shows that only a fixed amount can escape from the lake through the subterranean channel. The course of the stream is south-west, until it reaches the Rio Santa Barbara. At a place called *El Salto*, there is a fall of sixty feet perpendicular, over a ledge of rocks. The channel leading from the lake to the hills, is through a meadow, and the water *sets into it* with a perceptible current. In this channel there are a number of deep holes, called *pozos*, or wells, by the natives, which may be the places where the water enters its subterranean passage; but their bottoms seem to be mud, and there is no visible rush of water downward, whence I infer that the principal part of the water must enter from some point in the lake itself. This is the only place, at the southern extremity of the lake, except through the river Jaitique, where its waters are seen to flow from it, but there are probably numerous openings in its limestone bed, through which they find an escape.

"This is evident from the fact, that after leaving Sacapa, and crossing a range of hills, a spur of the Santa Barbara mountain, I found another outlet, called Rio Salala, a quarter as large as the Sacapa, emerging from beneath the limestone hills in like manner. It unites with the Sacapa lower down, near the point called *El Salto*.

"Proceeding further, and crossing several similar spurs of the Santa Barbara mountains, I came to a fourth outlet, still smaller than the Salala, called Rio

Agateca. After passing the considerable town of Santa Barbara, going northward, following the course of the mountains which border the lake on the West, I reached a fifth outlet, half as large as the Sacapa, called Sezacapa. Farther on, between the towns of Gualala and Ylama is a sixth outlet, the Yojon, as large as the Sezacapa. A seventh outlet, the Sesecate, of same size with the last named, occurs a league and a half beyond Ylama. All of these flow into the Rio Santa Barbara, the bed of which is about one thousand feet below the level of the lake.

"On the 17th of May, I left the town of Yojoa, situated on the *Camino real* leading from the Port of Omoa to Comayagua, (the capital of the Republic of Honduras,) to examine an eighth outlet of the lake, called Rio Blanco. This river flows out from the northern extremity of the lake, and looks more like an estuary than a river, with low and muddy banks, without perceptible current, and gradually narrowing, until it terminates in a meadow, containing about twenty acres, where it loses itself in a pond of water, of about an acre area, situated at the further extremity of the meadow. In this pond are three deep *pozos* or holes, through which the water probably filters into the subterranean channels leading under the hills. When the lake is full, the water is six feet deep all over the meadow. The amount of water which appears to escape here, falls far short of that which emerges two miles distant, where the river Blanco proper rises to the surface; whence I infer that there are other points where the water descends, within the lake itself. The river, after emerging, falls rapidly; and a mile below the point where it rises, falls one hundred and twenty feet at a single bound.

"Two miles to the eastward of the Rio Blanco, is a ninth outlet, called Rio Yojoa. And on the eastern side of the lake still another, with the same characteristics of meadow and channel, with just sufficient current to show the set of the water outward. This makes its appearance after an underground course of three miles, as the river Uri.

"We have thus *ten* outlets in all; one open, and nine subterranean, for greater or less distances. In the month of April, all the sources of this lake, even the great spring of Agua Azul, are dry, and the only water in this part of the country comes from this great mountain reservoir. From June to February, more water enters the lake than can leave by its subterranean outlets, and the surplus is discharged by the open channel of the Rio Jaitique. As I have said the rains had begun to fall during the night, at the time of my visit early in May, and the lake at once commenced to rise, so that on the first of June a small flow had been established in the Rio Jaitique."

Mr. Edwards adds that the lake derives its principal supply of water from numerous rills and small streams, descending from the inner slopes of the mountains of Santa Barbara and Miambar. Its most remarkable tributary, however, is the great spring of *Agua Azul*, or Blue-Water, having its origin in a cattle estate of the same name, and entering the lake about midway of its length, on its eastern shore. It is described as "an immense spring of clear blue water, seventy feet across, from which a stream flows into the lake, equal in size with any of its outlets."

There is a considerable belt of low, swampy land at the

southern extremity of the lake, the greater part of which is overflowed when the lake is full. Beyond the water-shed, however, and in the neighborhood of Taulebé and San José, the country spreads out in beautiful plains and valleys of the greatest fertility. Between these and Comayagua, the Capital of the State, lies the high *plateau* of Siguatepeque, 3,600 feet above the sea, from two to eight miles broad, and thirty miles long. It is remarkably cool and salubrious, wooded with pines and oaks, fertile, and producing the fruits and cereals of the temperate zone in the greatest abundance.

This is the extent of our present information respecting this remarkable lake ; and while it is far from satisfactory in all respects, it cannot fail to arrest the attention of intelligent travellers, and thus lead to a complete exploration. It lies within a day's journey of the line of the proposed Honduras Railway, to the Agents and Engineers of which we are indebted for the imperfect accounts here presented. They will no doubt have followers in the field of an equally inquiring spirit, who will be able to bring to the aid of their inquiries a larger degree of geological knowledge, which will probably do more to explain the peculiar features of the lake than any amount of topographical information.

It seems certain that the prevailing rock around the lake is the fossiliferous blue limestone, overlying the sandstone and slates which are exposed in all the valleys of this part of Honduras, and which are found crowning nearly all the hills bordering the line of the proposed railway from Port Cortez to Comayagua. Near the coast, in the mountains of Omoa, but of course of a much lower formation, are vast beds of a pure, white marble, brilliant in color, fine-grained, and compact. Beneath these is found a metamorphic red sandstone. Altogether, it seems that the mountains around Lake Yojoa are of the blue limestone alluded to, probably uplifted by volcanic agencies, of which the whole country shows extraordinary effects, and that the waters of the lake found their way through breaks and rents occurring on the plane where the limestone meets the underlying sandstone ; in other words, that the lake of Yojoa lies in a great limestone basin, full of cracks and fissures due to volcanic convulsions, through which its waters sink to the upper surface of the sandstone beneath, and then find their way through other or continuous fissures of the superior rock, until they emerge to light again, where the sandstone itself crops out, and the limestone ceases.

IV.—*Carl Ritter: An Address to the Society.* By Professor  
ARNOLD HENRY GUYOT, LL.D., COR. MEM. A.G.S.S.

Delivered February 16, 1860.

*Gentlemen of the American Geographical Society:*

Less than a year has elapsed since we assembled in this place to express our sorrow at the death of Humboldt, and to pay a just tribute of honor to his glorious memory, as to one who, for half a century, stood before the world as the embodiment and fit representative of all modern progress in the knowledge of the Physical Globe; and here we come to day, once more to mourn the loss of another great Master in our beloved science,—I might say the other great Master in the Science of the Globe,—Carl Ritter, the world-renowned author of the classical "*Erdkunde*," or *the Science of the Globe in its relations to nature and to the history of mankind*.

Humboldt, who first entered the scene of life and of his labors, first also left it on the 6th of May, 1859, at the advanced age of 90 years; and before another season was over, on the 28th of September last, soon after the close of his 80th year, Ritter followed him into a better world.

The two high-priests of the temple of Nature and of History have thus received the last summons from on high. When called, both were found still actively engaged in their high functions. They have obeyed the call; they are gone; but the temple that they have reared and beautified, and the Mighty One to whom it is consecrated, subsist, and both will last forever.

It is not in death alone that they are thus associated. Sons of the same mother country, living to the last in the same city,—in the city of Berlin, that great metropolis of German science,—united by ties of affection and by feelings of a deep mutual esteem and regard, they still live united in the memory of men.

For the last forty years the names of Humboldt and Ritter, constantly associated, have been household words with every one interested in Geographical studies. With them is connected, in the minds of all, the idea of a gigantic progress in the science of the globe,—a progress due not only to the addition of new facts, but, as is especially the case with Ritter's name, to a new dignity conferred upon that science by a more philosophical method, by the elevated stand-point from which it is viewed and treated, and by the living, harmo-



nious connection that has been established between it and the sister sciences. To these great minds also is traced, as to its main source, that reform movement which has impressed its stamp upon all the geographical literature of the day in Germany, has penetrated into every school, and the mighty flood of which, flowing over its primitive boundaries, has covered Scandinavia, Switzerland, now reaches England, and, I am happy to say, is making rapid progress in this country.

A conviction so universal, so deeply rooted in the popular consciousness, especially in that of the German nation, which reared them and received their immediate teachings, of that people endowed with so keen a power of appreciation of all kinds of scientific merit, can but correspond to a reality. That great progress cannot be denied. It is evident to the eye of every one who has had an opportunity of comparing the condition of geographical knowledge at the present day with that of half a century ago ; that is, before and after the period of the activity and controlling influence of Humboldt and of Ritter. But what seems less evident, less distinctly established in the minds of many, is the character of the peculiar element of progress contributed to geographical science by each of these two great Reformers.

The brilliant services, so recently discussed before you, rendered to the science of Terrestrial Physics by Humboldt the geographer and geologist, by Humboldt the physicist and meteorologist, by Humboldt the botanist and zoologist, by Humboldt the scientific discoverer of the New World and the experienced scientific traveller in Central Asia, by Humboldt the author of the *Cosmos*, are present to the minds of all. The physics of the Globe, that noble science, last born, but not least, among her sister sciences, owes him, as I have said elsewhere, its present shape and its best results. This remains his chief, his most glorious title to the gratitude of the scientific, and his labors mark the beginning of a new era, from which the knowledge of our physical globe, as a grand harmonious whole, will have to date its future steps in the career of progress.

How warmly Ritter acknowledged the high merit and admired the researches of Humboldt, how fully he appreciated their value, and joyfully hailed every new result obtained by his ingenuity, appears, among others, in a page of the Introduction to his great book, the "*Erdkunde*," especially devoted to Humboldt's labors, and in which he declares that without such a foundation as that furnished by the works of



Humboldt, his own work would have been impossible. But that very declaration shows that the work that he himself conceived and virtually performed, was still another than that attempted by Humboldt. For him the full knowledge of the physical globe, grand as it is in itself, is but a means, not an end. Our planet is a living organization which comprises the life of mankind. The central idea of the "*Erdkunde*," therefore, the inward principle upon which it rests, the principle of order which binds together all its parts, is that of a vital union of nature and of man into an organic unity. Its main task is the study of the unceasing, ever-renewed, and varied mutual action of these two factors. That idea must be clearly apprehended and well defined; it must be seized in its fruitful applications, in its rich consequences, before one can justly appreciate its full value, and understand the profound revolution that it has effected. Such a true appreciation alone will account for the vast influence that Ritter exerted upon his age, and for the fact that all thinking Germany dates, from the appearance of the "*Erdkunde*," the emancipation of Geography as an independent science, in the high sense of the term, possessed since of a principle of its own, and which takes its rank side by side with its sister science, the Philosophy of History.

You will agree with me, gentlemen, when I say that, great and well deserved as is Ritter's reputation in this country, it is—as all great reputations, indeed, but perhaps more so than usual—one resting upon authority. It is, if I may be allowed the expression, an imported one; and this, indeed, is not surprising; and we could scarcely speak otherwise of England, and still more of France. Ritter's theoretical ideas and methods are to be taken from a few academic memoirs, but more especially from his great work itself. There we find them realized in the rich, concrete forms of life. They never have been reduced by him into a regular abstract system or doctrine, a form altogether uncongenial to a mind which was so thoroughly filled with the vivid images of nature. These channels, together with his suggestive lectures to thousands of students during the long period of his public teaching, were sufficient to spread his spirit in Germany. But they are not so for foreign countries. The original memoirs just mentioned, though since published separately, are not of easy access. The very bulk of his main work has prevented, thus far, a translation of it into foreign languages, except, strange to say, one into the Russian, and a very partial one into the French.

How many, in this busy world of America, will attempt the careful reading of the nineteen volumes, the twenty thousand pages of close text, which compose the portion of the "*Erdkunde*" now published ; and that, too, in that rich, beautiful, but by no means easy tongue of Germany. These, I confess, are real obstacles much to be regretted, but which ought to be overcome, and ought not to be allowed to cut us off from the abundant stores of knowledge accumulated by that great scholar.

You have honored me, gentlemen, with a request to address you upon this occasion on the life and the works of Carl Ritter. I thank you for this privilege, for such I feel it to be. I responded to the call, however, with no small degree of diffidence. But aroused in my University days, by the teachings of that venerable and much beloved friend, to the study of his favorite science, which soon became mine ; guided in further steps by his kind, affectionate, and ever-ready advice ; cheered on at every stage of my scientific career by his deep sympathy, and the spontaneous expression of an unqualified approval—the last of which, traced a few days before the cold hand of death took the pen from his hand, has for me the solemn significance of his scientific will ;—loaded with such favors on his part, I felt that no personal consideration could justify me in declining the opportunity thus offered publicly to express the feelings of deep gratitude, and almost filial affection, which bind me to that great man, and at least to attempt to do justice before you to his claim to the gratitude of cultivated mankind. The task, however, as the nature of the subject may soon prove to you, is not an easy one, and it is in all sincerity, and more for his memory than for myself, that I must beg your indulgence for my willing, but perhaps inadequate, efforts.

The life of Ritter offers no great or stirring events. It is modest and serene, like himself. But it derives a peculiar interest from the circumstances by which a watchful Providence afforded, contrary to human expectation, the means best appropriate to a full development of the faculties with which he was endowed, and from his readiness eagerly and faithfully to improve every opportunity thus offered to him.

Carl Ritter was born on the 7th of August, 1779, in the city of Quedlinburg, the birthplace of the great poet, Klopstock, in the mountainous region of the Harz, in Prussian Saxony. He thus belongs, by the first twenty years of his life, so decisive for the character of every man in after life, to

the end of the eighteenth century, that remarkable era which can be called emphatically the mother of the present age.

There are, indeed, in the life of mankind, as in all that lives, critical times, in which it seems as if the fountains of life are stirred up to their very depths, and in which the forces of life are aroused to bring forth new productions more abundant and more beautiful. Such a stirring age was the end of the eighteenth century. It severs itself from the traditions of the past, which fetter instead of fostering human progress. It returns to the depth of human consciousness, in order to place itself on a basis at once more true and more solid. It turns its eyes, with the most sanguine hopes, towards an unknown future. A noble, sincere enthusiasm, ready for all sacrifices, seizes upon every soul, and imparts to the whole movement a dignity which its worst excess can mar, but not efface. It is truly a time of youthful renovation of the elements of human civilization, a creative age to which we may trace the beginning of all the progress of which our age can boast.

In every direction a host of noble pioneers strike new paths in the old, desolate fields, as well as in the new, untrodden ones, with the hopeful daring and vigor of youth, unaware of coming dangers, unmindful of difficulties. The French and American Revolutions in social science, Kant in philosophy, Schiller and Goethe in literature, Lavoisier in chemistry, Volta, Oerstedt in physics, Herschell in astronomy, Werner and Von Buch in geology, Humboldt in terrestrial physics, De Jussieu and De Candolle in botany, Cuvier in zoology, Ritter, at last, in geography, all begin, in each of these grand departments of human culture, a new era, the era in which we live; and it is on the foundation laid down by these glorious sons of the great movement of the eighteenth century, that we rear the splendid edifice which is the glory of the nineteenth.

The birth of Ritter, in such a time and such an atmosphere, can fitly be termed, in view of his future calling, a providential event.

Ritter's father was a physician, much esteemed for his skill and the noble qualities of his mind and heart. He died young, and Ritter's mother, a highly educated woman, remained a widow with five children, without any means to educate them. But help soon came, as providential help always does, from the quarter from which it could least be expected. The Prince of Bernburg took charge of the eldest son, ten years old. A distinguished, enthusiastic educator, Salzmann, previously unacquainted with the family, requested

the mother to intrust to him her young Carl, then five years old ; and Carl became the first pupil of the just opened and since celebrated school at Schnepfenthal, near Gotha, in Saxony, which still glories in having reared that great scholar. Under the enlightened guidance and loving care of Salzmann and his associate, the noble-hearted Gutschmuths, the former family instructor of Dr. Ritter's children, and a system of education, the object of which was to develop and invigorate the body as well as the mind and heart, the child grew to a happy, amiable, pure-minded young man. In that lovely valley, which Ritter always considered as his true home, at the foot of the Thuringian forest, far from the artificial life of cities, but surrounded by a charming and most varied scenery, he formed, at an early age, that intimate acquaintance with nature, and imbibed that love for the beauties of God's creation, which breathes in all his works. At the age of seventeen, when the question of his immediate future began to become an earnest one, Providence again provided for him. A rich merchant from Frankfort-on-the-Main, Mr. Hollweg, a partner in the large firm of Bethman, visited the school, and became so much interested in the young Ritter that he offered to send him for two years to the University, on condition that he would, after that time, take charge, in his own house, of the instruction of his children. The offer was accepted, and Ritter became, in November, 1796, a student at the University of Halle.

In 1798, he entered upon his duties in Mr. Hollweg's house in Frankfort, and with his characteristic, upright earnestness, devoted to the work before him his best energies. The most signal success crowned his efforts, and the strong ties of mutual affection which were formed between him and his pupils and lasted to the day of his death, a just and sweet reward for his devotion, honor both the pupils and the instructor. Of the two sons of Mr. Hollweg the elder died in his youth ; the other, a worthy pupil of such a teacher, is now the Minister of Public Instruction and Worship in Prussia, the noble-minded Von Bethman-Hollweg, the representative, in this high and influential position, of the liberal and enlightened tendencies of our age. In the education of a third pupil, the son of the celebrated S. Th. Soemmering, he met with equal success.

The situation of Ritter in Frankfort, and his connection with that wealthy and highly cultivated family, had a great influence on his life and his general development. Opportunities for improvement, rarely enjoyed to an equal degree by one placed in his early circumstances, opportu-

nities eagerly embraced by his ready and conscientious mind, were now offered to him. The qualities of his mind and heart had soon won for him in the family the position of an esteemed and affectionate friend. As such, and as an inmate of the house, he came in contact with the most refined society, and many of the most distinguished men of the age, who repaired to the house of Hollweg as to a common centre. Here was begun his acquaintance with such men as Humboldt, as the great geologist, Leopold von Buch, with the suggestive, truly philosophical S. Th. Soemmering, to whom he modestly refers, in the Introduction to the "*Erdkunde*," the merit of having especially called his attention to the laws of the geographical relationship of all animated nature. In Frankfort, also, he formed an intimate friendship with Ebel, the genial author of "*The Structure of the Earth in the Alps*" and other works on Switzerland, from whom he received a fresh impulse to the study of the Globe. Meanwhile, urged on by his duties towards his pupils, he embraced in his activity the most varied studies. History and the ancient languages received from him a particular attention. He read with his friends, the eminent philologists, Matthiae and Grotefend, the prominent authors of Greece and Rome. He thus diligently accumulated from all quarters, the treasures of that vast erudition without which his future work would have been impossible.

His predilection for Geography, however, becomes already apparent by the publication, in 1806, of six charts of Europe, followed afterwards, in 1811, by a Geography of Europe in two volumes. In these works the author of the "*Erdkunde*" is predicted, but not yet fully manifested. One element is to be added to his previous preparation, and this is a more direct acquaintance with the grand typical forms of nature and with the marvellous products of human culture. Ritter must see Switzerland and Italy—contemplate the wonders of nature and history in their very sanctuaries. That precious gift also was in store for him. From the year 1807, he repeatedly visited, with his pupils, Switzerland and Italy. The last journey, which commenced in 1811, extended over several years, and allowed him a sojourn of over a year in Geneva, and a prolonged stay at Rome and in Italy, which he visited to its southern extremity.

What a rich source of instruction these travels have been for a mind so eager to drink from the very fountains of knowledge, and so well prepared and matured by assiduous study

and labor, may be easily conceived. Switzerland and the gigantic fabric of the Alps, which he visited again and again until a few years before his death, furnished to his plastic and vivid imagination the most accomplished type of mountain scenery, with which to compare all the other grand systems of our Globe. The careful study of Italy and Rome, that classical soil of history and of art, clothed with the truthfulness of life his conceptions of the past ages, and gave him a deep intuition of the adaptedness of the beautiful climate, of the admirable nature, and the remarkable structure of the peninsular lands which surround the Mediterranean Sea for developing the brilliant flower of the civilization of the ancient world. Without these rich intuitions derived directly from Nature, says Ritter himself in the Introduction to his "*Erdkunde*," his work would not have been undertaken, as without Humboldt's labors, it could not have been performed. This remark clearly tells the high value that he attached to these personal experiences.

In every country that he visited he formed an intimate acquaintance with the leading minds of the time. During his protracted stay in Geneva, that scientific metropolis of Switzerland, he enjoyed familiar intercourse with the most eminent men of that school. De Saussure, the model scientific traveller and physicist of European fame, had just died, but A. Pictet, De Candolle, and many others remained. The intimate and fruitful friendship which soon united him to the first, no doubt contributed, together with the natural beauties of that privileged country, to cause Ritter to look upon his sojourn in Geneva as a bright spot in his life.

But of all men with whom Ritter met at this period of his life, none seems to have made a deeper, a more lasting impression upon him than Pestalozzi, the far-famed reformer of popular education. Ritter went to visit him for a few hours in 1807, in Yverdun, at that time the place of his residence, and remained there for months. Pestalozzi's sympathetic nature found in Ritter's soul a full response. Ritter's letters to him, copies of some of which happen to be in my possession, are full of expressions of gratitude and of the tender regard of a son for a respected and beloved father, and of admiration for the fundamental idea on which rests his method of teaching. His life-size portrait stood in Ritter's library. To him and to Gutsmuths, his fatherly teachers, as he calls them, and not to some high patron, he inscribes the first volume of his General Geography, as a token of his reverence and heartfelt gratitude.



In Rome he met with that triad of pure-minded artists, Thorwaldsen, Overbeck, and Cornelius, whose genius raised German art so high, and whose friendly intercourse gave him an enlarged view of art and a deeper insight into its nature. By the careful study of the topography of that most remarkable of all historical spots and its monuments, Ritter gathered copious materials for one of his most popular courses of lectures at the University of Berlin.

The period of preparation is now over for Ritter. Eighteen years have elapsed since the close of his first education in Schnepfenthal; eighteen years of assiduous labor in nearly all the domains of human knowledge, and of large experience in the world of nature and of man. He returns home, loaded with these new treasures, with matured views, and a clear perception of the grand idea, which he so gradually evolved from the depth of his rich nature, and which is to establish the science of the globe on a new foundation and breathe into it a new spirit.

But it is not enough for that great architect to have conceived and matured the plan, to have collected the materials for the edifice; he must rear it, realize his conception, and give it the tangible form of life. He soon sets himself at work and devotes all his energies to the performance of that arduous task that he now feels to be the work of his life. In the year 1814, he went to Göttingen with his two pupils now ripe for University studies. During two years he devoted his new leisure to a faithful use of that vast University library of Göttingen, then, perhaps, the richest among the rich ones which are gathered in so great numbers in Germany, on that classical soil of learning. Like Humboldt, a few years later, Ritter, then, could have been seen, a man of ripe years and known already by his vast acquirements, modestly sitting among the crowd of young students, listening to courses of lectures delivered at the University on topics most varied. Here also, as elsewhere, he soon gained the esteem of those who represented the intellectual progress of the day in that old centre of learning; and he enjoyed the benefit of private intercourse with most men of literary and scientific eminence at that time attached to the University. Among the last, particular mention must be made of the celebrated geologist Hausmann, with whom he remained united to the end of his days by the bonds of an intimate friendship, and who himself died a few weeks since, in December, 1859, but a few months after the departure of his old friend.

In 1816, Ritter went to Berlin, where he remained one year, busily engaged in finishing and putting to press the first edition of his General Geography, the first volume of which was published in that city by Reimer, in 1817, under the title of *Die Erdkunde im Verhältniss zur Natur und zur Geschichte des Menschen, oder Allgemeine Vergleichende Geographie, als sichere Grundlage des Studium und Unterrichts in physikalischen und historischen Wissenschaften*; "The Science of the Earth in its relation to Nature and to the History of Man, or General Comparative Geography as a safe foundation for studying and teaching Physical and Historical Sciences." In the spring of 1817, he returned to Göttingen, where he terminated the second volume of the work, which appeared in 1818.

These two volumes comprised only the continents of Africa and Asia, three Books out of twelve, which were to complete the whole work. But they revealed Ritter to the world, and were sufficient to place him in the high scientific position that he has since so successfully sustained, and so usefully occupied. In a masterly Introduction, he unfolds the views which he has so gradually matured, and which are to regenerate geography and to elevate it to the rank of the science of the Globe considered as a living organism. In the work itself, he practically illustrates the method, at once comparative and natural, or objective, as he terms it, which is commended by the lofty stand-point at which he places himself, and from which embracing the totality of his subject, he tries to master all its details, to grasp their beautiful arrangement, and to reproduce it in a truthful picture before the eyes of the reader.

But I beg your permission to leave for a moment all further considerations of that work, the merit and scientific influence of which I shall have soon to discuss, and to say a few more words on Ritter's life and activity subsequent to that important step in his career.

Ritter's merit was soon appreciated. The year which followed the publication of the second volume of the "Erdkunde" he received a call as Professor of History in the Gymnasium at Frankfort, which he accepted. In the autumn of the same year he was married, at the age of forty, to the accomplished woman who, for so many years, was the faithful and much beloved companion of his life.

In 1820, another call, the most honorable that he could receive, brought him to Berlin as Professor of Geography both at the Royal Military School and at the University, where that



chair, the first, it is believed, devoted to that special branch of knowledge in any German University, was created for him ; a public acknowledgment both of Ritter's merit and of the scientific character that had been imparted to Geography by his labors. This appointment was due to the enlightened and far-seeing Minister of Public Instruction, William von Humboldt, the highly gifted brother of Alexander, and to his successor, Von Altenstein, and reflects no little credit on the wisdom of these distinguished men, to the liberal and discriminating patronage of whom the cause of learning in Prussia is otherwise so much indebted.

Ritter has now found the appropriate scene of action and of further progress ; the field prepared for him by Providence, as he often gratefully acknowledged, for doing the work to which he felt called. Here, in the largest of the Universities of Germany, surrounded by a crowd of young men eager for knowledge and ready for every new light, for every new advance, he met with a most welcome opportunity for an application on a grand scale of the plenteous stores of learning and of scientific experience which he had been so long accumulating. To impart to minds thus prepared the new truths that he possessed, was to him not only a duty, but a delight. Moreover, living in the midst of an intellectual atmosphere in which reigned a most intense life, one of the first and blessed fruits of returning peace after the long disturbed condition of Europe ; a member by his very position, and by his universally acknowledged merit, of that circle of highly cultivated men, the *élite* of intellectual Germany, gathered in Berlin, his rich powers expanded to their natural limits, and the fruits of that long and laborious period of preparation which had preceded, came to full maturity. We may say that after the first ten years of his residence in Berlin, in the midst of such favorable circumstances, Ritter's mind had grown to its full stature, and his scientific views had taken that definite form which they preserved to the end of his life. These constituted, indeed, the noble share of light allotted to him. Nearly thirty years more were found too short to execute the grand conception that was before him as the goal to be attained.

Ritter entered upon his new duties with his usual ardor and cheerfulness. He was bent at the same time with no less earnestness on the continuance of his publications. In the same year, 1820, he had published a volume under the title, *Vorhalle Europaeischer Voelkergeschichten vor Herodotus am Kaukasus und an den Gestaden des Pontus*, or Vestibule to

the history of European nations before Herodotus, around the Caucasus and on the shores of the Black Sea"—a subject which had grown under his pen when writing the second volume of his General Geography on Western Asia. The first edition of the *Erdkunde* being exhausted, the following year, 1821, was devoted to the preparation of a second, much enlarged edition, the first volume of which, containing Africa only, appeared in January, 1822, thus beginning the new series of volumes which compose the work we now possess. That first fruit of his literary activity in Berlin, as he calls it himself, was followed by a long interval of full ten years, during which he issued only two papers read before the Academy of Sciences, a very graphic and interesting description of India in the Berlin Almanac for 1824, and several smaller contributions.

But that period was none the less one of intense activity for him and of paramount usefulness for the rising generation. The claims upon his talents as an academic teacher, became more and more numerous. In addition to his previous duties he took charge, from 1822, of the chair of history at the military school, left vacant by the death of his friend Woltmann. In 1825, he was intrusted with the direction of the studies of the corps of cadets. He was honored with a call to instruct in history Prince Albert of Prussia, a duty which he performed during several years. The Crown-Prince of Prussia, now Frederick William IV., whose taste for historical studies and brilliant attainments in that department of knowledge are well known, held Ritter in particular esteem, and the modest scholar was not unfrequently invited, during the winter months, to deliver discourses on subjects connected with Geography and history, before a select and private circle assembled in the royal palace. These marks of high favor and of trust, and the growing popularity of Ritter's lectures at the University, cheered him on in the work of diffusing, by oral teaching and by personal influence, the new views and methods in geographical science which he believed to be more consonant with nature itself, and helped, no doubt, the reform movement which originated with him and now began to spread itself. His lectures in the halls of the University were soon regarded as such as all students interested in true humanitarian culture should hear. While a large number of officers of the Prussian army were trained by him every year, or studied under his immediate direction and influence, hundreds of students left the University, carrying with them into all parts of Germany and into all stations of life, the remembrances

of his suggestive instructions, and the conviction that a new and better era had begun for the science of the Globe. Thus was prepared that renovation of Geography in the University and in the school which was demanded by the progress of the natural and historical sciences, but which awaited the genius of Ritter to assume its shape, and his guidance and spirit to produce its full effect, as it now has throughout Germany.

As one who had the privilege of listening, during a period of five years (from 1830 to 1835), to nearly all his courses of lectures, I may be allowed to add my humble testimony to that of so many of his hearers who remember his teachings with delight. Ritter, indeed, as an academic teacher, during his long University career of thirty-seven years, achieved a success rarely equalled. Few can boast of a more constant popularity. He came to Berlin almost unknown to the students, as was indeed the science itself that he was called upon to expound. A few sessions sufficed to increase the number of his hearers so as to fill the largest halls in the University. Not by any effort of striking eloquence of words or manner, did he secure a willing ear from his pupils, but by offering to their eyes a thorough, substantial, and yet pleasant picture of the vivid images and ideas which filled his own mind. His eloquence was not an impetuous mountain-torrent, with its brilliant cascades, its misty clouds, and tinted rainbows; it was a majestic stream gently rolling its mighty but peaceful waters, now amidst the green forest yet untouched by the hand of man, now among the rich fields, the flowery lawns, and populous cities born on its banks; never destroying, ever fertilizing all that it touches. Thus was Ritter's manner dignified, but always unassuming, simple, and natural. The tone of his full and harmonious voice breathed with kindness, and exerted, (I may be permitted to give at least my personal impression), a peculiar attraction. His words were always instructive and suggestive. The hearer could not help being impressed with the fulness and thoroughness of knowledge, the perfect mastery and love of his subject evinced by the lecturer, while at the same time he was charmed by the happy selection of the facts presented, which left before his mind, in clear outlines, the most essential traits of the subject. The drawings that he traced on the blackboard with the graceful ease of a skilful and practised hand, rendered his descriptions still more effective.

Another cause of his success is to be sought in the noble impulses of his moral nature. Ritter loved and pursued the truth for itself, but he loved man too. He was unwilling to

keep for himself the gift that he had received. He loved to teach ; he was happy in imparting to others the results of his discoveries ; his hearers felt it. Having been trained to become a teacher, his attention was constantly directed theoretically and practically towards finding the best method of training the young up to that high standard of knowledge which was before his mind. This explains the vast influence that he exerted, not only on science in general, but on the school system, and on the method of teaching his favorite science.

Of the regular courses of lectures that he used to deliver in the University, that on general comparative Geography (*Allgemeine Erdkunde*) gathered usually the greatest number of hearers. Those on Asia and on Europe, the historical continents par excellence, were not less interesting. But the most popular of all were the free courses (*publicums*), which he used to deliver twice a week, ordinarily in the winter session, on one or another of the most classical among the historical regions of our globe, Greece, Rome, and Palestine. Theologians, philologists, lawyers, men of intelligence of all classes, flocked there with the same eagerness, to hear from the lips of such a man the authentic and life-like description of these hallowed spots, these geographical centres of human activity, a description of which, in the mouth of Ritter, became a most graphic and instructive commentary on those historical events which have left the deepest mark in the annals of mankind.

The foundation of the Geographical Society of Berlin, in 1828, by Ritter, together with some friends of a kindred spirit, is another fruit of that period of his activity. Humboldt had just returned to Berlin, and delivered his celebrated course of sixty-one lectures on the *Cosmos*, which had swelled higher still the tide of popular taste in favor of the science of nature and Physical Geography in particular. This society soon became a welcome centre, not only for new geographical information, but also for communications on all kindred sciences, as well as for a social intercourse of the most pleasant kind among scientific men. Ritter was the soul of it, and much of that social kindness and of those liberal and enlarged views for which that society is distinguished may, doubtless, be attributed, in a great measure, to his influence. Admirably seconded by such men as Prof. W. Dove, the eminent physicist and meteorologist, and others, he abundantly contributed to the last to preserve its high scientific character by numerous communications drawn from his own studies, from his journeys in various parts of Europe, and from much new information sent

to him from all parts of the globe. It is well known to all in this audience that one of the two best geographical journals of Germany, the "*Zeitschrift für Allgemeine Erdkunde*," is published under the auspices of the Geographical Society of Berlin.

While so usefully engaged Ritter did not lose sight of the work which it was the object of his life to perform. Thanks to the ever renewed freshness of his mind and to his excellent health, he had thus far found time for continuing his studies ; but he now longs for greater leisure, which may permit him to resume the interrupted publication of his General Geography. By the influence of the Crown-Prince, who fully understood the high importance for science of a speedy termination of that classical work, he was enabled in 1831, with the consent of the Ministry of Public Instruction, to lay aside all business and duties not immediately connected with his studies. The result was not long in manifesting itself. In 1832, the second volume of his "*Erdkunde*," the first of Asia, a volume of nearly twelve hundred pages, was published, and inscribed by the author to the Crown-Prince, as a token of gratitude for the precious leisure granted to him. From that time until 1838, six other volumes of equal size, or one volume a year, were issued, and give evidence of the amazing industry of that great scholar ; and in the twenty-one years following, that is, to the end of his life, eleven volumes more, or one volume every other year, tell of his ceaseless activity, notwithstanding his advancing age. The last, and nineteenth volume, which nearly terminates Asia, was issued but a few weeks before his death.

During these long and assiduous labors the only interruptions that he allowed himself, were the journeys that he used to take nearly every year in the long autumn vacation. But even then it was only changing the scene of his studies. Notwithstanding the prodigious erudition evinced in his work, which would seem to suppose a life entirely spent among books in the stillness of the closet, Ritter never, at any period of his long career, gave up that familiar intercourse with nature from which he had derived, as from a pure source, his best and deepest instructions. When came the hot summer days, shaking off the dust of the libraries, he went to visit his old and true friend again. Selecting one of the regions of his favorite continent of Europe, as an object of new study, he would live for months, now amidst the grandeurs of the Alps or of the Pyrenees, now under the happy sky, among the monuments and the people of Italy, or again amid the stern landscapes and

hospitable inhabitants of Scandinavia. He returned with an invigorated body, and with a mind refreshed and ready for new labors. He thus visited successively the most interesting countries of Europe. Central and Southern Germany, and the system of the Alps were the objects of a repeated and thorough examination, each time with a special object in view. Thus also Switzerland, that he loved above all, and Northern Italy, the Pyrenees, the South and the West of France, with the central plateau of Auvergne and its extinct volcanoes, Belgium, Holland, Denmark, Sweden, and Norway, were, one after the other, drawn into the yearly extending circle of his excursions. A long journey in the south-east of Europe made him acquainted with Hungary, the table-land of Transylvania, as remarkable for the variety of its races and nations as for the interest presented by its geographical structure; with the extensive plains of Wallachia and Bulgaria, Constantinople, and at last with the classical soil of Greece, that he knew so well how to describe. He never saw, however, Palestine, which had been on his part the object of so minute a study; and still every spot of it had become so familiar to him, that when he was lecturing on the Holy Land, his hearers could scarcely help believing that he was giving them a narrative of his own travels. It is said that when asked why he did not visit a country which was for him one of so deep interest—"What new information," said he, smiling, "could I derive from a visit to Palestine? I know every corner of it." None, assuredly, had more right to speak so than he who had seen so much of the land of promise by the eyes of a host of skilful observers. But I believe I am not mistaken when I regard that answer, if he really gave it, as a word not of boast, but of self-consolation. To know more than he did on Palestine, would have required an amount of time and means which were not at his disposal. But if the opportunities which we now have to see, in the course of a short season, the land of the patriarchs, and the theatre of the life and of the death of the Saviour of the world, had existed in the days of his strength, I venture to say that Ritter would have seen the Holy Land. He knew too well the paramount value of personal observations, even of a rapid glance at such a country, to esteem as of little account the privilege of storing his mind with truthful, life-like pictures from nature, instead of the unavoidably imperfect images traced by the slow pencil of a laborious study of absent objects.

The importance of these travels for Ritter, was great in every respect. Not to speak of the much needed relaxation



that they afforded to his mind, the accumulation of a larger number of new observations on most of the countries of the continent of Europe, towards which all his studies seemed to gravitate as towards a natural centre, was in itself a great gain. To these direct impressions from nature also, we may trace the source of that freshness of imagination and of style which he kept through life, that truthfulness and vividness of description which betrays the man fully conversant with nature.

But an advantage of a still more substantial character resulted to Ritter, from that acquaintance with nature so faithfully kept up. Nowhere more than in Europe do we find gathered within a small compass such a variety of natural regions, each with well-defined characters of land and people. They offer, indeed, to the observer specimens, as it were, on a diminished scale, of the most characteristic physical regions which compose the other continents. In the gigantic system of the Alps and of the Pyrenees, with their snowy peaks, their hardy and energetic races, we see the Caucasus and the Himalaya. In the fertile plains of Lombardy, that lovely garden of Italy, with its streams, its delta, its lagunes, we study the great plains of the Ganges, encompassed by the high wall of the Himalaya and the moderate heights of Deccan, as the plains of the Po by the Alps and the Apennines. Germany from the foot of the Alps to the sandy plains of the Baltic, gives us a perfect model of these lands of terraces, these forms of transition, as Ritter calls them, which gradually descend towards the low lands, and traversed by secondary chains of mountains form the grand steps through which the Alpine streams have to find their way to the ocean. Towards the East the course of the Danube, cutting through the high barriers which separate that series of continental basins, the plains of Bavaria, Austria, Hungaria, and pouring its waters into the open and maritime plains of Valachia, forcibly reminds us of the great Chinese streams descending by long steps through similar obstacles to the rich plains which border the ocean. The massiveness of the Scandinavian chain, with its broad and flat tops, its scattered and isolated peaks, its chasm-like valleys, is not without analogy with the most characteristic portion of the Andes, while its deep fiords, with those of Scotland, scarcely find elsewhere their equal, and remain the most remarkable type of that phenomenon.

In the races and nations of Europe the variety is scarcely less striking. On one side of the Alps we meet with the quiet

but deep nature of the man of the North, exhibited by the Scandinavian and the German; on the other with the impulsive and passionate nature of the man of the South, so manifest in the inhabitants of the Mediterranean shores. In the West, the nations lead the chariot of human civilization; in the East, semi-barbarian races scarcely follow it with Asiatic sluggishness, or are only forcibly drawn into the whirl of modern progress.

It cannot be admitted that a growing familiarity during half a century with geographical and ethnographical types so varied and so instructive, should not have exerted a deep influence on Ritter's mind and labors. Such a study, indeed, could not help increasing the marvellous power that he possessed by nature, to construct from imperfect, often contradictory documents, the grand traits of structure of the continents, and to establish the true character of the natural regions of our Globe that he could not visit. His innate tact in the selection of the materials to be received, ripened thus into an almost unfailing power of judging of the value of the various sources of information which he had to use. Moreover, during these excursions he paid frequent visits to the great centres of civilization—Paris, London, Vienna—in search of scientific documents, that he could not find elsewhere. He was received everywhere with marks of the highest esteem, and thus found welcome opportunities to form a personal acquaintance with the men most eminent in the various departments of study embraced in his own labors.

Ritter's reputation was soon established in Germany, though the new element of culture that he has developed is essentially cosmopolitan, and was demanded by the progress of our age, the form in which it was presented by him, his mode of thought, as well as his style, are so thoroughly German, that it is there that he found an immediate and full response. There he was understood and appreciated. German writers often speak of him as "*our Ritter*," thus expressing feelings not only of an affectionate reverence for him, but of a just national pride in him, and of a full identification with the man whom they thus honor. Abroad, the knowing ones acknowledged his value and gave him numerous tokens of high esteem. His royal master, as well as a number of other sovereigns, bestowed upon him the honor of various orders of merit. From 1822, a member of the Academy of Sciences of Berlin, he was successively elected a member of most of the learned societies in Europe and in this country, the long list of which he placed on the title-page of the



"Erdkunde," not from a feeling of a vain boast, of which he was utterly incapable, but of grateful acknowledgment of the honor thus conferred upon him.

Thanks to a scientific position so eminent and so universally conceded, and to the lively interest which he took in all progress, Ritter became more and more, like Humboldt, one of the most important centres for geographical and ethnographical science, and a ready helper and considerate adviser for all those disposed to collect new information in all parts of the world.

When men who have wielded a vast influence for the good of mankind appear before posterity, the world first inquires about the work that they have achieved and the intellectual and moral powers by which they have accomplished it. It judges them as instruments, as parts of the great social organism, and determines its estimates by the importance of the functions performed by them. But human sympathy craves a more personal acquaintance with these prominent representatives of human nature. We want to know something of the deeper-seated qualities of mind and heart, which manifest their moral nature in their personal intercourse with their fellow-men, and reveal them as, on earth, citizens of a higher world. I may, therefore, be pardoned if I yield to the temptation of adding some words on the person and private character of Ritter. The task, indeed, is an inviting one. For if in him we admire the savant, we love and admire still more the man.

Ritter's personal appearance was full of serene dignity, one might say of antique repose. His tall and erect stature, his strong, broad-chested frame, his firm but quiet step, his well-marked features, his high forehead and intelligent eyes, gave him an imposing look, which, however, was tempered by a benevolent smile, an unassuming and kind manner, and an expression of goodness and candor which at once inspired confidence. The portrait, by Krüger, which is before your eyes, gives a perfect likeness of Ritter when about fifty-four years of age. He was then at the height of his popularity in the University of Berlin. Complying with the request of hundreds of his admiring students, he consented to have his likeness taken by the excellent artist just named, and the very successful original drawing was presented to him by the one who now addresses you, as a member of a committee of three, acting in behalf of their fellow-students.

Ritter's peculiar turn of mind was more intuitive than logical, more synthetical than analytical, more objective than

subjective. His deeply receptive soul, always ready for new impressions, was a pure mirror in which nature was reflected not only in its details, but in its totality. When after having worked out these impressions into a clear perception by a careful study, he tries by speech or pen, to convey them to others, it is still in that objective, concrete form which is before his mind that he does it, without attempting to draw on the picture the sharp and well-defined lines that a purely subjective, logical method requires, but that nature itself has not traced. While, therefore, his views and his method are entirely original, we seek in vain in his works for a formal system, an absolute idea rigorously carried out. His unflinching loyalty to the truth as he sees it, not as he infers it to be, seems to render such a systematization uncongenial to his mind. He shrinks, indeed, from all cold, formal, and empty definitions. Even his most characteristic conceptions, those which constitute the spirit of his method, preserved much of the nature of deep intuitions, the expression of which is always highly suggestive, but often lacks that clear, logical shape, which would make them easy to define, and would give them immediate currency. With a mind essentially constructive, he descends, nevertheless, with the most scrupulous care, into the study of the details, and it is upon the well-secured base of facts alone, and with a sense of the true, sometimes amounting almost to divination, that he builds up his broadest generalizations. From what precedes it can already be inferred that Ritter possessed, in a high degree, that noble faculty so prominent in all great students of nature, in a Humboldt, an Agassiz, that plastic imagination which gives us the power to keep before the mind the true and vivid images of natural objects, whether in their isolation, or by a synthetic view in their natural associations, as in one great picture, and thus enables us to perceive the relations which bind together the most distant parts, more easily and surely than a simple analytical process could ever do.

Of those moral excellences which adorn man's inmost nature, Ritter possessed also more than the usual share. His perfect purity of mind, his amiability, his unwearied kindness, won him the high esteem and the good will of all. His mildness of temper, the peace of mind which pervaded his whole nature, his loving disposition, spread around him an atmosphere of peaceful happiness, which exercised a sympathetic influence on those who came in close contact with him, and secured him their deep affection. He was a warm and most

faithful friend ; in the circle of his family most tender-hearted and affectionate. Himself childless, he was a father to many of the children of his immediate relatives, and others less near to him. He never knew any feeling of egotism. His modesty was as sincere as unaffected. He was always ready to ascribe his own progress to the influence and suggestions of other master-minds from whom he was conscious of having received new impulses ; as if a rich soil was not as necessary as the seed itself to the luxuriant growth of a noble plant into perfect beauty and richness of fruits. To give a public expression of his gratitude to such men as Pestalozzi, Soemmering, Ebel, Humboldt, was for him a delight.

With regard to the last, of whom he had become a rival in glory, no other feelings ever found room in his heart than those of affectionate reverence and of deep gratitude for the services rendered to science, by one whom he used to call "our great master." A more heartfelt and discriminating acknowledgment of the merits of Humboldt cannot be found than Ritter's address to him, in behalf of the Academy of Sciences of Berlin,\* when that distinguished body, on the 4th of August, 1844, celebrated, by a congratulating deputation, and a banquet on the next day, the anniversary of the safe return, forty years before, of the great traveller from his memorable journey in tropical America. The answer of Humboldt is not less characteristic of his own modesty and feelings ; and well may we rejoice at so noble an example and take heed to a lesson from so high a source. For this was not a simple exchange of politeness for the occasion. The life of both assures us that it was the expression of true feelings. Humboldt's death had no more sincere mourner than Ritter. Indeed, his last strength was used in writing numerous letters, four of which were directed to America, to urge, in warm terms, upon the sympathy of all cultivated nations, and especially of those in the Western Hemisphere, the claims of the "Humboldt-Stiftung" of that Institution, the object of which, now well known to you, is to perpetuate in a manner congenial to Humboldt's spirit, the memory of his name. Ritter hailed with equal delight every new advance arising out of the mighty impulse which started from him, and which seemed, in some manner, to go one step beyond his own results. He only rejoiced that his own labors had been instrumental in preparing it, thus proving that

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\* See *Zeitschrift für Allgemeine Erdkunde, Neue Folge*, vi. 318. *Mai*, 1859.

his most earnest desire was the promotion of knowledge and not of his own name.

But if all these noble gifts bestowed upon him by nature, were brought to the fulness of a harmonious and normal development, it is only by drawing new sap from a still deeper source of excellence, from a strong and living Christian faith. Ritter never spoke much on this subject; nor are there found in his writings any formal, uncalled for, expressions of his religious convictions. He was not the zealous, polemic, critical partisan of any particular intellectual formula of the Christian faith; but his life and his teachings breathed that meek, trusting, and loving spirit by which we recognize the true disciple of our great model. Here, as in his scientific efforts, the living substance prevails over the dead form. In that sphere also, we can follow the phases of a gradual, but sure progress, which led him to the aim. Brought up by Salzman under the rationalistic influences then prevailing in Germany, but in an atmosphere of great moral purity, his loving heart and scrupulous conscience soon led him further. In the second period of his life the feeling of his indebtedness to a kind Providence grew every day stronger, and increased the sense of his moral obligations towards his Heavenly Father. In the third period, which begins with his first sojourn in Berlin, his Christian convictions assumed a more definite shape. His friendly intercourse with that modest and living Christian, the Baron von Kotwitz, who was a blessing to so many in Berlin during a whole generation, doubtless exercised a happy influence upon him. Later in life we find in Ritter the sincere, humble, and joyful Christian, grown to his full stature, who reveals himself by that oneness of mind and heart, that harmony of thought and action, which can flow only from a perfect and willing obedience in love to his heavenly Master. But let his own words bear testimony to his deep convictions.

When his students requested of him a motto to be placed at the bottom of the portrait just alluded to, he gave them that sentence that you read in the autograph which is before you: "Our earth is a star among the stars; and should not we, who are on it, prepare ourselves by it for the contemplation of the Universe and its Author?" Truly, the expression of the spirit of his instructions and of his "Erdkunde!"

In the last letter that it was my privilege to receive from him, Ritter, alluding, without the shadow of a murmur, however, to his advanced age, his declining strength, his approaching departure, speaks also of that work, the object of his

life, which he was obliged to leave unfinished, a mere fragment of his whole conception ; " but," he adds, " we live according to the higher calling which guides us, (and quoting Paul, Rom. xiv. 8,) for whether we live, we live unto the Lord ; and whether we die, we die unto the Lord ; and whether we live, therefore, or die, we are the Lord's." A touching testimony to his Christian resignation !

The following words from his private journal, found after his death, are more explicit still, and so well reveal his whole soul that I cannot forego the pleasure of making them known to you. I quote them from the translation of the excellent memorial by Dr. Kramer : " Although at present, while preparing for a journey to the western part of France and the Pyrenees, I am healthy and well, life nevertheless lies in the hand of God, whose mercy and grace have guided my fate so wonderfully and gloriously, that I cannot but sing to Him, the All-good, praise, and glory with all my power, in all my thoughts and actions. Should it not please Him to let me return to my beloved family and to my calling, but should he assign me another place in his heavenly kingdom, that I may obtain happiness, a happiness which already here sometimes has moved me to tears of joy, then I ask my friends not to grieve over my going home, for all that the Lord does is done well. My eternal fate my Saviour in his great mercy will decide. In deep acknowledgment of my infirmities and sins, I am still full of trust and confidence, since I know that my Redeemer lives, who will make his people partakers of the mercy of the Eternal and Just one." A glorious utterance, indeed, of his Christian hopes !

We believe in the word of Him, who said to the trusting petitioners, " according to your faith be it unto you." Carl Ritter has now entered the heavenly mansions, and is admitted to the contemplation of the wonders of the universe and the adoration of its Author, for which he was so well prepared. He left this earth, the theatre of his long labors, in profound peace, after a short illness, on the 28th of September, 1859. On the 1st of October his mortal remains were placed by the side of those of his wife, who preceded him by nineteen years. His immortal soul has gone to its long-desired home.

Such was the life of Carl Ritter. It flowed like a peaceful and fertilizing stream through the long period of two generations. With the steadiness of a healthy growth, and that harmonious use of all his powers of mind and heart, with that honesty of purpose, without which true wisdom cannot be attained, he pursued his lofty aspirations undisturbed by

the storms of the revolutions and of the wars, in the midst of which he spent the first half of his life.

The fruit of his labors he left to us, as a rich heritage, bestowed upon civilized mankind, and ready for all those who wish to have a part in it. It remains for us to examine in what it consists, and in doing it we shall soon perceive that the more intimate acquaintance that we have made with Ritter's character, is not without value for the right appreciation of his scientific labors.

Ritter, indeed, declares himself, in the Introduction to the "*Erdkunde*," that the fundamental idea which underlies all his work, and furnishes him a new principle for arranging the well-digested materials of the science of the globe, has its deep root in the domain of faith. This idea, he adds, was derived from an inward intuition which gradually grew out of his life in nature and among men, and could not be, beforehand, sharply defined and limited, but should shine, as it were, through the work, and become fully manifested by the completion of the edifice itself. That noble edifice is now before us. Unfinished though it be, it reveals the whole plan, and allows us clearly to perceive that fundamental idea on which it rests. It is a strong faith that our globe, like the totality of creation, is a great organism, the work of an all-wise Divine Intelligence, an admirable structure, all the parts of which are purposely shaped and arranged, are mutually dependent, and by the will of the Maker fulfil, like organs, specific functions which combine themselves into a common life.

But for Ritter, that organism of the globe comprises not nature only, it includes man, and with man the moral and intellectual life. If the idea of a great Kosmos, as applied to the universe, or to our physical globe, is not new, nay, is as old as the primitive cosmogonies of the past ages, it is the merit of Ritter to have made a special and most happy application of it to the geographical studies. None before him perceived so clearly the hidden, but strong, ties which mutually bind man and nature; these close and fruitful relations between man and his dwelling-place, between a continent and its inhabitants, between a country and the people which holds it as its share, these influences which stamp the races and nations each with a character of their own, never to be effaced during the long period of their existence. In this common life, however, man, the nobler element, is the ruling power. If, in the period of his infancy, nature is for man a fostering mother, in the days of his youth a loving sister, exercising on



him a shaping influence, in the time of his full growth and manful activity, it becomes in his practised hands, and under the guidance of his commanding mind, an instrumentality for higher purposes and for the performance of that work of intellectual and moral development to which mankind is called, and which is the normal end of this earthly economy. Considered under this new aspect, every portion of our globe, stamped by nature with a peculiar character, assumes a new meaning and a new importance. As the body is made for the soul, so is the physical globe made for mankind. In an organic body the disposition of the parts, the structure of the organs, cannot be accounted for except by the functions which they are destined to perform. So in the globe, the geographical forms, the size, the peculiarities of structure, of climate, the natural associations of plants and animals which characterize each of the continents, and of the well-defined physical regions of our planet, have no intelligible meaning, no obvious reason of existing in that particular shape, unless their final object is revealed by their powerful influence in shaping the development of the races and nations which live within their bounds, and by the use that those nations made of them as instruments of their activity in the common life of mankind.

This organic idea, if you will allow me the expression, is the new principle which is to substitute order for confusion, in that overwhelming mass of geographical, physical, and ethnographical details of which Geography then consisted. To the necessity of such a principle Ritter, doubtless, alludes, when selecting for the epigraph of the "*Erdkunde*," this word of the reformer of modern science, Lord Bacon, "*Citius emergit veritas ex errore quam ex confusione.*" This organic idea substitutes beautiful, intelligible symmetry, for unmeaning, casual arrangement; law for accident; relations of cause and effect for disconnectedness; unity for isolation. It gives us a criterion for judging of the value of each detail, and of the relative importance of each order of facts, which can only be determined by their relation to the whole. Fully carried out, it would give us a clear picture, and the true measure of the powerful influence of that constant factor of nature in the ever-changing life and relations of human societies through all historical ages. Nay, when casting a glance at that vast scene prepared by Providence for the moving drama of history, and seeing so many compartments, admirably arranged and ready, it seems, for any emergency, in which as yet no performance has taken place, are we not justified in believing

that the great geographical arrangements of our planet are foreshadowing the future destinies of mankind ?

One feels that to treat Geography from such a point of view and in such a spirit, is to begin a new science. It is the science of the living globe, it is physiological Geography. The old walks will not do any more. With a firm and trusting step we must boldly enter the new path which has been opened by the hand of genius, for that path alone will lead us to the temple of knowledge.

This view was the normal synthesis required by the rapid progress of physical, ethnological, and historical sciences, which, since the beginning of this century, have shed so much light on the deeper nature of the physical world and of human society. It was that harmonic unity of elements, diverse and yet akin, craved by every philosophic mind conversant with the results of scientific inquiry. The philosophy of history, that science of modern times, hails now, with joy, the birth of a still younger sister, the Philosophy of Geography, the one a help to the other ; both forever as inseparable as man is from nature.

Ritter not only laid down the principle of a new science, but he attempted to carry it out. He succeeded beyond expectation, for the task that he thus assumed was great, and seemed to exceed the strength of one individual man. It implied a careful and critical re-examination, under a new light, of the original sources of our geographical knowledge, and of the historical data connected with it, and a new method of investigation, of combination, and of exposition of the results. His predecessors in Geography could be of little avail to him. If Eratosthenes, says he, wrote the first astronomical Geography, Herodotus and Strabo the first geographical history and historical Geography, Bergmann the first geographical physics, Buesching the first geographical statistics ; these works, excellent though they were for their special purpose, could do little more than prepare materials for the one contemplated. Each of them lacks the principle of unity, which alone can place the geographical element in its proper light, and give to it its full value.

But among his distinguished contemporaries, none was to him of so much help as Alexander von Humboldt, who summed up in himself the progress of the age in the physical and natural sciences, as applied to the science of the globe. I have said how gratefully Ritter acknowledged his indebtedness to Humboldt's labors, which furnished him the indispensable foundation for his own edifice. His investigations of the gen-



eral laws of distribution of heat, represented by his system of isothermal lines, of the distribution of plants, as depending upon the two main elements of climate, heat and moisture, of the marine currents as modifiers of climate in similar latitudes, were of general application to all parts of the globe. His admirable labors on the tropical regions of the Western Hemisphere had revealed to the scientific world the true nature of that massive structure of the Andes, and of the vast table lands of Mexico, so gigantic in their proportions and still so simple when compared with the system of the Himalaya, the Alps, and the complicated nature of the plateau of Iran. He had shown the decided preponderance of these huge elevations in mass of large portions of the earth crust over the narrow chains of mountains in shaping the characteristic structure of the continents. He had demonstrated the intimate connection of these grand plastic forms with the rapid changes in the climate, the plants, and the animal life, which are observed at every step, when ascending their slopes, and delineated, in vivid outlines, the various zones of ever-changing vegetation, through which the traveller gradually passes from the luxuriant forests and stifling atmosphere of the plains of the Amazon to the bare or snow-clad paramos of the Andes. Instead of the unmeaning uniformity suggested before Humboldt, by a glance at the map of tropical America, we now see rising before our minds a series of richly colored pictures, a series of physical regions, of well-defined geographical types. We see how they owe their existence and their special characters to these fundamental traits of the structure of the continent, and to the powerful influence which that structure exercises on the climatic conditions, and through them, on animated nature and man himself. Here the boundless Llanos of the Orinoco, alternately a burnt, dusty, and lifeless desert and a sea of verdure, teeming with temporary life: there the Selvas of the Amazon with their endless, impenetrable forests, their luxuriant solitudes, as yet untamed by civilized man, too powerful in their exuberance of nature life, for the few scattered savages, the only tenants of these rich wastes. At mid-height in the Andes, the happy regions around Ibague, Popayan, Loxa, with their everlasting spring, their murmuring brooks, their shady forests, and evergreen foliage; on the broad summit of the Andes, between a double row of the highest volcanoes of our planet, the cool, but healthy valleys of old Peru, with their invigorating air, their open and cultivated plains, their extensive lakes, their ancient civilized people of the In-

cas, who from this lofty abode, as from a high throne, exercised a beneficent power on the surrounding slopes down to the shores of the ocean. In delineating, with a master hand, all these natural types so strongly marked with distinctive characteristics, these sharp contrasts between sister countries of the same landmass, and that variety of natural aspects, Humboldt actually revealed for the first time the true nature of the continent. He did more, for he clearly traced the close connection and the mutual dependence of all those orders of natural phenomena, and taught the true method by which such an investigation should be conducted in every other portion of the globe.

Such a knowledge, Ritter felt, was to be acquired of every other continent, and above all, of the historical continents. That alone could be a safe basis for the further study of the influence of those distinct natural regions on man's character and peculiar development, and on the special functions performed in the civilization of mankind, by the nations which occupied them during the periods of their growth and activity. Applying to the study of Geography the objective and comparative method to which the natural sciences owe their rapid progress and a deeper understanding of the system of organized beings, Ritter carried out a series of investigations which led him to results which are acquired forever to geographical science, and are, or soon will be, universally regarded as fundamental truths. I beg leave briefly to mention those which have exercised the greatest influence on the recent progress of Geography, and are more characteristic of his method.

Every one of the great landmasses raised above the ocean is a geographical individual, which differs from all the others by its size, by its form, horizontal and vertical, by the arrangements of its parts or its internal structure, by its climate, by the peculiar association of plants and animals which belongs to it, and by the character of the race of men which occupies it. The continents are the primary organs in the great organism of our planet. Their specific characteristics have to be determined by a careful study of all their elements, and a close comparison of their analogies and differences. Their relative situation, the arrangements which bind them into a connected whole, and their peculiar position with regard to the great zones of climate, or their physical situation, as we might call it. "*Räumliche Anordnung und Weltstellung*," in Ritter's style, should not receive a less share of attention; for those general relations, combined with those

specific characters, are the fundamental causes which determine their special functions in the life of nature and of mankind. Ritter discussed each of these topics in a series of five papers which were read before the Academy of Science of Berlin, between 1826 and 1856, and which have since been reprinted separately in a small volume, to which I have alluded, together with the introduction to the "Erdkunde," under the title of "Memoirs to serve as a foundation for a more scientific treatment of Geography," "*Abhandlungen zur Begründung eine mehr wissenschaftlichen Behandlung der Erdkunde.*"

In treating of the configuration of the continents, Ritter considers both their horizontal dimensions, or the size and the contours, and their vertical dimensions, or the absolute and relative elevations of their mass which constitute their relief. To the study of this last element, which act so powerfully on the climate, and through it on all animated nature, and which has been nevertheless so long neglected, Ritter gives a decided prominence. A continent is not the flat surface that maps seem to indicate; it is a solid body, the plastic forms of which have to be carefully delineated. Ritter distinguishes the extensive low-lands, maritime and continental, from the massive elevations of the table-lands or plateaux, and these again from the linear elevations of the mountain chains. To the table-lands, or elevated surfaces, he assigns, like Humboldt, the most important part in these vast structures. He showed that every continent has for its centre a large intumescence which makes, as it were, its main trunk, and around which are grouped as many secondary organs, its various physical regions. From that high central mass, and from the mountain chains which often mark its borders, the main streams of the continent descend towards the low-lands and the ocean, through a series of terraces or mountainous districts full of fertile valleys, which connect, as transition forms, the central highlands of the low, maritime plains of culture which surround them. Still beyond, far projecting into the domain of the ocean, rich peninsulas, as in Asia and Europe, form a third circle, and with large islands, true fragments of the continent scattered along its shores, surround the whole structure with a series of most useful appendages, as with a garland of brilliant flowers.

When compared under this aspect, the three continents of the Old World, not to speak of the others, show striking differences. Africa has one large and uniform plateau filling the

Southern half of the continent, and descending on three sides by terraces destitute of low-lands, to the shores of the ocean. The Northern half, comparatively low and uniform, is a burning desert, separated from the main plateau by the fertile terraces and the plains of Soudan, and from the Mediterranean Sea by the long and isolated mountainous plateau of the Atlas, and the small plateau of Barca. Simplicity and uniformity of structure is thus the share of Africa. Asia, on the contrary, has two central plateaux, one in the East, the other in the West, both with lofty mountain chains, broad terraces, extensive low-lands, and projecting peninsulas; it is a double continent; the land of huge forms, of extremes, and of the most striking contrasts. In Europe another type still prevails. The central table-land on which the Alpine system rests, loses its primary importance in the presence of the gigantic mass of the Alps and the mountain form, more broken, more articulated, as it were, becomes typical of the continent.

The contrast between the various continents is not less remarkable, when we compare the horizontal forms of contour which are themselves but the consequences of the variety of plastic forms just mentioned. Africa is a compact mass, shut up in itself, almost inaccessible to the influences coming from the ocean, deprived of these deep indentations, and projecting peninsulas, which abound in Asia and Europe. Even the corners of the triangle which seems to be the fundamental shape of every continent, are all rounded off, and the shape of Africa approaches that of an ellipse. The line of contact of land and water is reduced, as it were, to a minimum; and that uniformity of outlines betrays the simplicity of its internal configuration.

Asia, on the contrary, is deeply indented, and its gulfs and peninsulas present themselves on a scale commensurate with the magnitude of that king among the continents. Innumerable continental islands, and among them the largest to be found amid the oceans, surround it, and add to it an amount of land almost equivalent to another small continent, while Africa can only boast of Madagascar.

Europe again, that peninsular continent of the Old World, is still more indented. Here the mixture of land and water is carried to an extreme. The line of shores of that smallest of these continents, surpass by one-half that of the large mass of Africa. One-third of its whole surface is cut off in peninsulas. If Africa is a vast trunk without members, Europe is the

most articulated, and, in its smallness, the most perfectly organized of all the continents.

Ritter traces the vast influence of these individualized portions of the landmasses which surround the main body of a continent, on civilization. Climates are diversified, the formation of distinct nations favored, a greater variety of human faculties called into action, mutual relations and reciprocal influences increased, which, in the indented continents, unfold the hidden powers of man to a degree unknown in the continents less favored in this respect. The coincidence between the uncivilized state of the nations which possess Africa, and the impenetrability of that continent, between the brilliant development of mankind in Asia, and above all in Europe, and the variety and perfection of their geographical organization, is too striking to be called a fortuitous one. It forces us to acknowledge, in that remarkable peculiarity of structure, one of the causes which have determined so great a difference of functions in these three mainlands of the Eastern Hemisphere.

The views to which I thus briefly allude, are among those which have acted most immediately on the reform of the geographical method used in the schools. The valuable works of Roon, Voelter, Kloeden, and a host of others in Germany, the highly suggestive manuals of such genial writers as F. de Rougemont in Switzerland, derive their special excellence from the application of these principles to geographical teaching. The whole system of school cartography had to be changed, and accommodated to the new wants thus created. As Berghaus' Physical Atlas, the only original foundation for all the others, which have appeared under different names, was called forth by Humboldt's labors in Physical Geography, so the crowd of the new German school atlases and wall maps, which seek by the best possible method, still to be found, to make clear to the eye, by drawing, by colors, or otherwise, the main features of the relief of the continents, were called into existence by the wants suggested by Ritter's method.

The relative situation of the continents and their climatic position, gives them a distinct historical character. For mankind Asia is the land of the rising sun, as also the cradle of rising humanity. It is the Orient *par excellence*. Europe is the land of the setting sun, the Occident, the land towards which the brilliant orb advances. Africa is the burning South, the Soudan of the earth, as Ritter calls it, the land of the mid-day sun. In Asia the nations look backward towards a luminous past. Traditions, carefully preserved, of glories gone

by, keep their eyes turned towards that golden age from which they derive their wisdom, leave them without the hope of ever attaining a higher blessing, and thus stop their progress. In Europe men look forward, their faces turned towards the advancing sun, following it in its march and longing to plunge with it into the ocean of a mysterious future. Africa, the land of the meridian sun, equally unmindful of the past and the future, is sunk in an inactive, unmeaning present. These three continents again are grouped into an Eastern Hemisphere, which is to become the Orient for the new Occident, for the New World of the Western Hemisphere, which, in its turn, represents the land of future progress, contrasted with that of the old traditions of the past.

By the historical element in Geography, Ritter means not a certain amount of historical facts connected with a geographical spot, but the variety of functions performed by the same geographical elements, or the same natural regions, in the different ages of civilization. These functions are necessarily variable, since they depend upon the power of the cultivated nations to make use of these elements furnished by nature, as instruments for the particular work which these nations are called upon to perform in history. At the beginning of civilization, when the first, the most urgent want, was the possibility of gathering together, within a moderate compass, a large number of men, and thus to establish the social and political relations, without which human progress is impossible, the large plains of culture fertilized by the main streams of the continents were of paramount, of almost exclusive importance. The rich valleys of the Nile, of the Euphrates, of the Ganges, of the Chinese streams, are the prominent geographical centres for mankind. The broad ocean, the Mediterranean even, lie then forgotten and without use. When the great historical work in progress was the education of the mental faculties of man by Greek civilization, how prominent was the value of every geographical feature of that little peninsula of Greece, of its mountains and valleys, of its indented shores, of its genial climate, of its situation between the lands of the old oriental civilization, and the Western peninsulas which awaited culture from her. How different again when Rome began the great social work of the Roman empire, which was to gather under one powerful sceptre, the scattered civilizations of antiquity. The land of Greece sunk into insignificance, but the central position of Italy, in the midst of the Mediterranean world, thus far without value, made Rome the natural heart of that



great organism. The Mediterranean, so neglected by old Egypt and Assyria, became the common arena and the bond of union of the extensive domains of Rome, and the high road of civilized nations. The open ocean, then the dreaded insuperable obstacle to a further extension of mankind, had no function in the development of man. But now that by the progress of astronomical science and the art of navigation, man has mastered that redoubtable abyss, and knows how to oppose the wind and waves by the power of steam, the ocean in its turn has become the highway of commerce and intercourse between the most advanced nations of the Earth. To its shores they flock feeling, as by a secret instinct, that the power and wealth of a nation, in this age of universal interchange of gifts, depend upon the free access to that great door which opens for it the richest lands of the inhabitable globe. Thus the relative value of every one of the geographical elements, is constantly changing for man with the development of his own powers and the progress of history.

It only remains for us to see how Ritter applied these various principles in his "*Erdkunde*." After what has been said, a brief review of the plan and the method pursued in it will suffice.

The intention of Ritter, as he informs us, was to treat of the whole globe in twelve books. This number was no arbitrary one. It is easy to perceive that the idea of a great organism to be studied and described according to divisions marked out by nature itself, and their actual relations, was constantly before his mind. Each book was to contain one of the primary geographical individuals, a continent, for instance. The first book was devoted to Africa, the second to Eastern Asia, which is almost a continent by itself, the third to Western Asia. These are the only ones which he has written. What the other books would have contained, we are not told. The continent of Africa is the most uniform in its outlines, in its structure, its natural features in every respect; that of Europe is the most varied, the most highly organized. The order pursued, therefore, is from the simple to the more complicated; from the lower organism to the higher.

In describing a continent, Ritter, as I have remarked, looks upon it as an individual structure, the controlling feature of which is a central plateau. Around that central mass, as around a main trunk, are spread the lowlands, and from its high margins descend stepwise, in every direction, long terraces with their valleys and other streams towards the low plains, or sometimes reach uninterrupted to the sea-

shore. It is, therefore, in that order that he describes the various parts of such a connected mass of land. Beginning with the central highland, continuing by its terraces and lowlands, he terminates by the peninsular appendages and the islands which belong to it. A first bird's-eye view, traced with master-hand, gives the general features, the plan of structure, as it were, of the continent, and indicates the arrangements and the relations of all its parts. Then entering upon the detailed description, and proceeding from the cold and less favored regions to the warmer and richer climes, he characterizes every natural division, treats of its physical condition, of its people, of its present and historical functions, and usually terminates by a retrospective view, in which he gives to the mind, enriched by the specific knowledge acquired, a still more complete and precise view of the whole organism and of its distinctive characteristics.

A rapid view of the application of this method of description to the continents of Africa and Asia, may substantiate this short statement, and serve as a key to the arrangement of the matters contained in the "*Erdkunde*," which appears to many rather intricate, perhaps because unusual. The first book, Africa, contains four divisions, *Abtheilungen*: High Africa, or the main table-land; the transition forms to the lowlands, with their terraces and their water-courses descending from the highland; the isolated plateaux of the Atlas and of Barca, and the lowland of North Africa, or the Sahara.

The large divisions are subdivided into sections and again into chapters (*Abschnitte* and *Kapitel*), which equally correspond to so many physical regions, but of less extent and importance. In the first division, which treats of the central highland, the first section is devoted to the South margin, and its terraces descending towards the Cape of Good Hope, with three chapters describing the high table-land of the Orange River and its race of men; the middle terrace of the Karroos; the lower terrace or the shere region. The second section comprises the Eastern border of the highlands and its terraces down to the shores of the Indian Ocean, with the two chapters treating of the Kafir coast, and of the coast of Sofala and Mozambique. In the third section we are led to the North margin of High Africa, in which we find, in four chapters, the description of the high terrace of Kaffa and Narea, of the table-land of Abyssinia in general, the plateau of Abyssinia proper, and the terraces which descend from that Alpine land towards the sea and the lowland of North Africa. The fourth section com-



prises the Western margin of the continent with four chapters, giving successively a review of the South-western coast of Africa from Cape Negro to Cape Gonzalès ; of the regions on the Zaire River, in Congo ; of the highland of the Ambos, and of high Soudan on the North. A fifth and last section is devoted to that almost isolated member of the continent, the Western half, or prolongation of, the North Margin, containing, in two chapters, the description of the table-land of the Mandingos, the region of the sources of the Senegal, Gambia, Niger, and the Kong mountains.

Having thus completed a first systematic review of the central highland, Ritter, in a second division, takes up the transition forms from the highland to the lowland, that is the great river systems and their neighboring regions, which are always the connecting links, the great highways between the two for the people and commerce. One section is devoted to the Orange river, the characteristic stream of South Africa. Another, in two chapters, to the terraces and streams of Middle Africa, the Senegal and Gambia, and the mysterious Niger with East Soudan. The master stream, Nile, follows next, in six chapters ; one for the region of its sources, and the upper course, two for the middle course in Sennaar and Nubia, three for the lower course, upper, middle, and lower Egypt, or the Delta Lands.

Now the attention of the reader is directed in a third division, to the isolated highlands of the Atlas and of Barca, which, detached from the main trunk of the continent, border it along the Mediterranean Sea and the ocean. The Atlas plateau with its mountain chains, its surrounding border regions, along the sea-shore and towards the Sahara, with the races which occupy it, and the small table-land of Barca, fill each one of three chapters.

The fourth and last division, the low-land of Africa, comprises two sections, the Eastern and the Western half of the great desert of Sahara and Sahel. In the first section, three chapters describe first the Eastern shore of that land ocean, and its entrances from Egypt ; then its Northern shores, and a third treats of the Oases and of their influence on the development of the neighboring nations of the desert. In the second section the description of Western Sahara and Sahel, and the tribes of the desert, occupies the last two chapters. A retrospective view of the whole continent of Africa closes the book.

The continent has thus been methodically divided into its

grand natural districts ; each has been described, and the mutual dependence and subordination of each of these physical regions, their arrangement into a grand organic structure, as it were, is constantly kept in view.

Nor does even that organic division, if I may call it so, stop with the larger geographical districts which correspond to the chapter. In nearly each of them we find a series of explanatory paragraphs, *Erläuterungen*, which make as many minor groups, or treat of special subjects which belong to regions described in the chapter. As an instance, we find in the chapters treating of the Delta the following *Erläuterungen* : on the two main arms of the Nile and the history of their changes ; on the inundations of the Nile, its freshets, its alluvial deposit, the foundation of cities on its banks in ancient times ; the history of the formation of the Delta of the Nile ; the valley of the Wandering, the Natron Lakes ; and a retrospective view of the Nile stream and its influence on history. Still more special discussions form separate paragraphs under the name of "Remarks," *Anmerkungen*. In all, the sources of information are carefully compared, weighed, and referred to in numerous quotations.

The same method of description, at once so exhaustive and so thorough, has been followed in the two books and eighteen volumes devoted to Asia. But here the extent of that mass of land, the variety of the physical structure, the high historical importance of almost every spot of that old parent continent, explain the necessity for the distinction of a much larger number of natural regions. It would be useless to mention here more than the grand divisions and the order in which they are treated.

I have already said that Asia being, as it were, a double continent with two central table-lands, forms two books. After an admirable introduction which gives a general view of the whole continent, Ritter begins with the central Highlands of Eastern Asia. The East and North margin and the central regions, the South borders, or the Himalaya system, are described in as many sections. Next, the transition forms and the great water-courses descending from the heights of the table-land, are considered ; the Eastern group, or China and its mighty streams ; the South-eastern, or Indo-China ; the Southern, or India proper, with the system of the Ganges, terminates the second book.

The third book, or Western Asia, is far more voluminous. Evidently when reaching the true historical regions, the work

grew under the pen of its author much beyond his expectation. One division, nay, one section alone fills one or more volumes. Western Asia, which begins with the seventh volume of the whole work, scarcely terminates with the nineteenth. The first division describes the lands which Ritter calls the transition forms between Eastern and Western Asia. The system of the Indus, with the Punjaub, Cashmere, and the high valleys of the Himalaya, the Hindo-Khu, the high tableland of Turkestan and the massive chain of the Bolor, down to the low-lands of the Caspian Sea, fill the volume. The Iranian World, or the central plateau of Western Asia, and the surrounding countries connected with it, begins properly the second half of the Asiatic continent and the second division. A full introduction, giving a synopsis of the plateau or Iran under its physical, archaeological, and ethnological aspects, precedes, and gives the general features which secure for the Iranian world an individual character. The Eastern mass, or Afghanistan, the North and South margin, along the lowlands of Turan and the Persian Gulf; the Western mass, or Persia, and Aderbidschan, form as many large sections, and occupy two volumes. In the third division the transition forms, or the great water-courses are considered, the twin system of the Euphrates and Tigris filling two volumes. The fourth division begins the description of the isolated members of Western Asia. The Peninsula of Arabia to the South, occupies two volumes. The fifth division, in two sections, covers the Peninsula of Sinai, Palestine, and Syria, the first with one, the other with two volumes. The last division is devoted to Asia Minor the natural end, toward the West, of the plateau of Iran, and is treated in two volumes.

It is easy to see by the gradually greater extent given by Ritter to the latter part of his work, that besides the reason just assigned for it, namely, the increasing interest attached to those regions which have been, from the highest antiquity, the scene of history, the plan of the author underwent a slight modification. Ritter's habit of thoroughness and the abundance of new materials accumulating every day, give this latter part of the "*Erdkunde*" the form of a series of monographs, which may be considered as standard works on each of the countries thus described, and as embodying about the sum total of our knowledge up to the date of their publication. Among the most new, we may name the volume of Eastern Asia, containing a digested account of all the English and other labors on India and the system of the Himalaya; and again, the two

volumes on Arabia, which are entirely unique of their kind. The monographs of Sinai, Palestine, and Syria, belong, it will be conceded on all hands, to the most thorough which exist. A series of monographs of another nature, treating of the history, the geographical extension, and influence on civilization of several plants of culture and of domesticated animals, such as of cotton, coffee, of the camel, and others, are interspersed among the volumes of the *Erkunde*, and remain models of the kind. In questions of that order Ritter seeks the laws, and one of his academical memoirs is devoted to an essay on the principles of a Geography of the natural productions useful to man.

The picture that I have just attempted of Ritter's ideas, method, and labors, sufficiently defines, if I err not, the part performed in geographical science by that faithful and gifted scholar, from that achieved by Humboldt. Humboldt seeks to determine the general laws of the physical world. Ritter seizes them as applied, and in their concrete and actual connection in every given country and in the whole globe, and considers nature in its totality as an element in the development of mankind, from which alone these natural forms and influences receive their true and final significance.

At the moment these faithful guides leave us to ourselves, when their voice will utter no more words of wisdom, it may be well for us to ask ourselves how far they led us in the high road of science, and what is the task which is still before us. Humboldt, with a surpassing richness of knowledge, attempted to give us a connected picture of the totality of the physical universe; but admirable as is the *Cosmos*, after having read its eloquent pages, we pause and involuntarily ask for the final object of the Creator in building up that marvellous structure; we ask for a tie which connects it with Him, at least that portion of the creation in which we dwell; for a voice which rises from it as a word of praise, and we find it not. Far from me even the idea of casting a blame upon the great and good philosopher; I am fully aware that his plan was purposely limited to the material world which is his theme. I only wish to remark that we cannot stop there.

It is, indeed, a universal law of all that exists, as I have elsewhere said, not to have in itself either the reason or the entire aim of its existence. Every order of facts, like every individual being, forms but a portion of a greater organization, the plan and the idea of which go infinitely beyond it, and in which it is destined to play a part. The reason of its exist-

ence, therefore, is not in itself, but out of it; not below, but above it. The explanation of the beautiful but often mysterious arrangements of the physical globe is to be found not in it, but in the higher moral and intellectual sphere of man for whom they were made, in order to be there the means of accomplishing a more exalted end than their mere material existence. The key which opens for us the mysteries of the evolutions of history, is to be sought in that future perfect economy which is its end, and towards which, under God's guidance, human progress is advancing with a steady step. A science of the globe which excludes the spirit-world represented by man, is a beautiful body without a soul. Ritter, as I trust I have abundantly shown, put a soul into that body. This will make his memory live forever in the grateful remembrance of all lovers of true science.

Let us, therefore, continue in the footsteps of these masters in science. Humboldt furnishes the means; Ritter marks the goal. Like Humboldt, let us study nature in a truth-loving and devoted spirit, and, with combined forces, perfect that edifice which he has already reared so high. Like Ritter, let us, with scrupulous care and a pure mind, pursue in all parts of our earthly domain the investigation of these wondrous harmonies of nature and history, of which he has traced the great outlines. With the lofty ideal which was before his mind, let us try to realize his conception, which still needs a further growth to unfold all its beauty; and we shall have a right to look with hope towards a future science and a future Cosmos, which will be the full and adequate expression of the wisdom and goodness displayed in God's plan of the material and moral creation, which will satisfy all the legitimate craving of the human mind for knowledge, and which by its very utterance shall be, according to Ritter's own words, man's song of praise and of adoration to the divine Author of the universe.

V.—*Ascent of the Shire, a branch of the Zambesi, South Africa. A letter from DAVID LIVINGSTONE, LL.D., D.C.L., COR. MEM. A.G.S.S., to the Foreign Corresponding Secretary.*

Read January 5, 1860.

TETE, ZAMBESI, Tuesday, Feb. 22, 1859.

MY DEAR SIR :—Having been elected a member of your society, I take the liberty to send you a short account of our attempt to open the interior of Africa, in the hope that, though it may not appear interesting to your members, it may, at least, show my good will and desire to perform a corresponding member's duty.

We entered the delta of the Zambesi in May, 1858, taking the most southerly branch we could find, but after ascending about seventy miles we found it impossible to enter the Zambesi by that, as the points of junction were filled up with reeds and other aquatic plants. You may have a clearer idea of the region if you bear in mind the fact that the Zambesi has, in the course of ages, formed a delta, which juts out into the ocean and forms the most prominent part of the coast. The prevailing winds of these quarters beat, almost constantly, against the head of the promontory. These, aided by the oceanic currents, have helped to dam up the main stream, but the pent-up waters have escaped sideways. The main stream, called Luabo, enters at the point of the promontory most exposed. To it we went after leaving the Southern branch, but saw no possibility of entrance during three days, though H. M. S. *Lynx* has since found a channel in it, after a search of ten days. We then proceeded to examine the side branches, and the very first we came to, called Kongone, was all we required. There are other good ports, but all in the side branches. There are also communicating branches between these, and those within the influence of the tides are generally deep.

Having got into the main stream, we found that we had, in going to it and spending a month there, allowed the water to fall considerably. It was also so very much lower than usual that the Portuguese prophesied that we could not ascend ten miles. It was said also that war was raging, and no one would be allowed to go up, even if he could. Our ship drew nine feet seven inches, and she was under engagement to go to Ceylon. We, therefore, to avoid detention in the river, sent her off, and went up to the seat of war in a small steamer,

drawing two feet six inches. We had no difficulty with the "Rebels," as they were called ; indeed we got pilots from them, and continued ever after on the best of terms with the Portuguese. They were called "Rebels," as they had all been runaway slaves, and bore the marks, in brands on their chests, of their former servitude. Slaveholders here must be civil, for it is so easy to run away, and if slaves go to the Landins, who are of the Zulu family, they never deliver them up. I have never heard of but one case to the contrary, and the owner—a great favorite of theirs—was obliged to give them his full value. This is a digression, but I may finish off by saying that the Portuguese Governor attacked the rebels, and they retired before him, there being plenty of room for all parties.

We continue carrying our luggage up the river till November, when it reaches its lowest point, and with care a flat-bottomed boat would do business even then. We know it now at its very worst, and, as it spreads out to from one to three miles in breadth, it is in many of the crossings not more than two and a half or three feet. Just now the water stands twelve feet above low-water mark in November, and we are all quite sure that during, at least, eight months in each year a steamer of four or five feet could trade without embarrassment. The reasons why so little has been known about the Zambesi River, have been the branching in the stormy promontory by which it was hidden from navigators. And then easy-chair geographers, dreaming over the geography of Ptolemy, actually put down the Zambesi as flowing into the sea at Quilimane, which, in his days, it probably did, though not a drop of Zambesi water, in ordinary circumstances, reaches that port. Had some branch of the Anglo-American family planted their footsteps on its banks, we are such a babbling newspaper set, the world would have known all about it long ago ; and no one would have ventured to play with this river as has been done, making it lose itself and flow under the Kalahari Desert. You may form a better idea of its size if I tell you of one of the branches. We ascended the Shire lately, fully a hundred miles from the confluence, and found it with a two-fathom channel all the way up. It varies from eighty to one hundred and fifty yards in width, and contains no sand banks. It flows in a beautiful fertile valley, about twenty miles high, and fringed with mountains of great beauty, well wooded to the top. One, Morambala, we ascended, and found it 4,000 feet high. (This, by mistake, is placed on the wrong side of the Shire in my map.) It was well cultivated on the top, and had several fine



little fountains, the waters of which were slightly chalybeate ; they have a hot sulphurous fountain at the base, (temperature  $174^{\circ}$  Fahrenheit.) The people had many sweet potatoes, holcus sorghum, and other grains, and pine-apples, lemon, and orange trees. They were very hospitable, and are independent. The vegetation is very different from the plains, and so is the climate, yet, with all these disadvantages, no use has been made of it as a sanatorium by the Portuguese, and, as far as we can ascertain, this river has never been explored by Europeans before. One part of the luxuriant valley of the Shire is marshy, and abounds in lagoons, in which grow great quantities of the lotus plant. The people were busy collecting the tubers, which, when boiled or roasted, resemble chestnuts. They are thus real Lotophagi, such as are mentioned by Herodotus. Another part of the valley abounds in elephants. My companions estimated the numbers we saw at eight hundred. Herd upon herd appeared as far as the eye could reach, and noble animals they were. We sometimes chased them in our little steamers, for the shore branches off occasionally and forms islands. The upper part of the valley is well peopled, and many of the hills are cultivated high up. But never having seen Europeans before, they looked on us with great suspicion. They watched us constantly, well armed with bows and poisoned arrows, ready to repel any attack, but no incivility was offered when we landed, nor were our wooding parties molested. We obtained what may be considered reliable information that the Shire actually does flow out of Lake Nyanza. We were brought up by a cataract, but five days beyond this point the water is smooth again, and Arabs come down in canoes from Nyanza thither. Seeing the suspicion we had aroused, we deemed it unsafe to leave the vessel and go overland. But no collision took place. The greatest coward fires first, so, thinking we had as much pluck as them, we did not lift a gun, though we saw them once ready to fire, or rather shoot. We did nothing to make us ashamed to return, and mean to do so next month ; and if we have their confidence we may go further.\* They had abundance of provisions, and sold them

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\* The following is an extract from a private letter written by Dr. Livingstone to a friend in New York. It is dated "Murchison's Cataract, Oct. 12, 1859 :—"

"We have traced the Shire up into Lake Nyenyes, or Nyasa, and found that there are only thirty (say thirty-three) miles of cataract, and the river becomes placid again, right into the lake, in lat.  $14^{\circ} 25'$  south. Here we have my fondest hopes realized in a quarter I never dreamed of, for a road could easily be made, and a steamer placed in a region which, for cotton and sugar and checking the slave trade on the east coast, cannot well be over-estimated. Shirwa, or, as its



at a cheap rate. Also cotton of two kinds, one indigenous, short in the staple but very strong and woolly to the feeling, the other very fine, and long in the staple. We bought a number of specimens of their spindles and yarn, and as it was quite equal to American Uplands, did not offer them any American seed. The cotton-plant is met with everywhere, and though burned down annually springs up again as fresh and strong as ever. They grow sugar-cane, too, bananas, &c. The men are said by the Portuguese to be very intelligent, but very mild. The women wear the lip ornament, around one of which I put my pen. The slit is made in the upper lip, at first, by a ring in childhood. The ends are gradually pressed closer together, and cause absorption till the hole is made. This is enlarged by bits of reed, till in a lady of fashion a ring, either hollow or cup-shaped, is inserted, and the edge of the lip protrudes beyond the perpendicular of the nose at least an inch. I am thus particular in case our own ladies, who show a noble perseverance when fashion dictates, may wish to adopt lip ornaments.

Above this we have a rapid, called Kebra, or rather Kaorabasa. When the water is low it shows a deep groove, with perpendicular sides. When steaming up this the man at the lead kept calling "no bottom" at ten fathoms, and the

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proper name is Tamandua, is about ninety miles long. Nyassa no one can tell how far off its "head" is, but both lie parallel to the east coast, and slaving parties from the interior must cross the Shire near its point of departure from Nyassa, and then pass along the partition between the two lakes, in order to get away to the eastern ports. We encountered a party of these worthies with a great many slaves and elephants' tusks, and a more blackguard-looking lot you could not turn out of Bridewell. When they heard we were English they evaporated. We bought some fine specimens of malachite from them. Now, an establishment for lawful commerce, and for the spread of that gospel, the only cure for human woes, on this lake, would be an immense benefit to Africa and to England. My heart yearns over our own honest poor as well as over the African, and here is a country with room enough and to spare. It lies somewhat in this fashion, three terraces east of Shire; its own valley being one, and as like the Nile at Cairo (only broader) as two peas; this may be called 1,200 feet high, a second 2,000, a third 3,000 feet, but sloping down to Tomandua (1,800 feet); the highest point, eight or ten miles off, must be 8,000 feet. These terraces are full of running rills. We, that is, Kirk, Charles Rea, and thirty-three Makalolo, travelled in the hottest period of the year; but the highest terraces were delightful, and Yomba, 6,600 feet high; very cold at night. My companions never saw a country so well watered anywhere. We have changes of climate within a few miles, and a country the finest for cotton and sugar in the world. It is unlimited in extent, and cotton is now grown over it all. The indigenous kind has been supplanted by the Shire and at the Lake Nyasse by better kinds from foreign seed. Dr. Kirk got pepper growing on Yomba. \* \* \* \* We saw indigo on the banks of the lake seven feet high, burned down but growing fresh again. In some parts a good deal of salt is found in the soil and sea. Island cotton would flourish. At any rate, the foreign kinds introduced are better than good Egyptian.

top of the walls of the groove towered from fifty to eighty feet above our deck. It is from sixty to eighty yards wide, but at this season is comparatively smooth. There were some cataracts in it which high water obliterates. This steamer is too weak to ascend. She being only ten horse-power, and her plate one-sixteenth of an inch thick, we dare not try her in the rapids. We shall work down here some time yet. I long to lead back my faithful Makalolo, who are still at Tete, though thirty of them died of the small-pox, and six were killed by a neighboring chief.

I shall refer to one point more before concluding. We were warned by the fate of the Niger expedition, not to delay among the mangrove swamps of the Delta—the very hot-beds of the fever. We accordingly made all haste to get away, and we took daily a quantity of quinine. The period of the year I selected, though not the most favorable for navigation, was the most so for health; and, thank God, our precautions were successful.

The Kroomen from Sierra Leone have had more of it than we, until a short time ago, when, it being the most unhealthy season of the year, and even to the natives, three of us have had touches of the complaint, but are all now quite well. I have never had a day's illness since my return. We find, too, that so far from Europeans being unable to work in a hot climate, it is the want of work that kills them. The Portuguese all know, that so long as they are moving about, they enjoy good health, but let them settle down and smoke all day, and drink brandy, then—not a word about brandy in the fever that follows—the blame is all put on the climate.

DAVID LIVINGSTONE.

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VI.—*Zoological Geography: or, the Geographical Distribution of Animals.* By ALFRED MAURY, COR. MEM. A.G.S.S., General Secretary of the Geographical Society of Paris. Translated by EDWARD RICHARD STRAZNICKY, MEM. A.G.S.S.

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THE study of the migrations of nations is certainly one of the most curious and the most difficult branches in the science of Ethnology. The problems which it suggests, require for their solution an acquaintance with the whole circle of human

sciences. If it is indispensable to present such an array of light, in order to make clear the vast labyrinth of routes which the human races have taken upon the face of the earth, what efforts will not be necessary to systematize animal migrations! Man speaks, writes, recollects; his history, even the remotest, has always for its basis either a tradition or a few monuments. The animals, however, being dumb, leave no other traces behind but their bones or shells. They raise no monument to testify their presence, and the student of natural history is reduced either to a speculation upon their foot-prints, or the collection even of their excrements. The history of changes which have taken place in the habitations of the various species of animals, the revolutions through which the zoological map has passed, the conquests of one species and the destruction of others—these present the most interesting phenomena in the science of Geology, and are bound up with the most recondite questions on the history of the globe. We possess for the discovery of the earlier migrations of the various organized beings but incomplete and scattered elements. Still we are enabled by the study of fossils, and by an attentive comparison of the present orders with those that have perished, to trace the general lineaments of animal geography. In following the changes which have taken place at various epochs, in the distribution of species of animals, we arrive at certain laws which govern the distribution of all beings upon the earth. The study of their present state is, of course, less difficult, and may be made complete. During the last thirty years the local Fauna has been described with so much care, that it is easy to trace out upon the map the regions which the known species have inhabited. To determine the distribution of species in previous periods, is a work which can only be illustrated by the future progress of paleontological science. We possess, however, some important facts which will serve as landmarks on our journey, and from which, at this day, conclusions of the highest interest can be drawn. In this paper we shall endeavor to set down, in their order, the advances which have been made in Zoological Geography and Paleontology, so far as they throw light upon the distribution of the extinct races of the animal creation, and the aggregate of the respective results will demonstrate, how far our knowledge extends up to the present day, about the history of the migrations.

I.—The animals are not merely accidentally distributed upon the globe. The presence of each species in a cer-

tain locality, of course, presupposes a union of conditions necessarily dependent upon the organization and nature of the living animal. This dependence is in proportion to the various wants to be satisfied, and is exactly measured by the susceptibility of the organism to the influence of surrounding circumstances. Hence the very unequal distribution of species. Those which easily find the necessary conditions for their existence, are more abundantly distributed than those which require special care for their shelter and nourishment. We need, therefore, not be astonished, when we observe, in tracing upon the map the dividing lines between each species, such enormous irregularities and apparent anomalies. While there are certain animals which can be found at any point of our globe, others are confined to a space not exceeding three or four thousand square miles. The limits of the range allotted to the several species or races of animals cannot, of course, be marked by fixed boundaries, like those of political States. The animal being, by nature, an errant creature, is the more nomadic, as the country where he has to find his food, is subject to rapid exhaustion. He traverses at once a vast space, and is endowed with great power of locomotion. He often pushes his reconnoitring excursions beyond the wonted boundaries. He lives like the nomadic nations, constantly obliged to seek new shelter, and returning to such localities that seem best adapted to his habitudes, removing with the seasons, and is easily entrapped into the pursuit of animals that serve for his nourishment. Hence the migrations which, with certain species, take the character of periodical and distant voyages. The care of reproduction imposed upon these animals, especially the birds and fishes, will cause them to select the most favorable localities for the deposition and hatching of their eggs. These long and distant voyages which, particularly, have obtained the name of migrations, we all observe to take place with the swallows, the wild ducks, the mackerel, and the herrings. In fact, nearly all animals emigrate according to seasons, en masse or alone, but particularly the birds and fishes. While a large number of them is looking at various distances for food and for the means to bring up their offspring, certain individuals remain sedentary, and are not obliged to remove to distant regions to escape famine and cold. The domestication or equivalent care which secures to the wild animal shelter and food, strips him of his nomadic usages, and attaches him to the soil or to man who thus comes to his aid. The neighborhood of cities and towns attracts certain species,

and makes them permanent. The concentration of domesticated animals procures for them resources which they would have to gather over a large space of wild country. Many return suddenly to a region, because the motives of their previous emigration have disappeared. The celebrated Swedish naturalist, Nilsson, pointed out the appearance of a bat (*vespertilio noctula*) in his country, in 1825, which has not been observed by Linnée, nor by any other Swedish explorer, and when at the restoration of the Cathedral of Lund, bones of such animals were found in its walls, which proved to be the same vespertiliones, it demonstrated the fact, that seven hundred years ago these animals were very numerous in the Southern portion of the Swedish Peninsula. The *motacilla alba* disappeared in like manner from Sweden, in the last thirty years.

The zoological map appears necessarily very changeable, and permits us only to guess at the relative extent assigned to each species. Their displacements, however, cannot trespass certain extreme limits—a few cases excepted—beyond which the animal cannot live and multiply. Thus we arrive at certain laws of distribution for each race and species, which furnish the basis for Zoological Geography.

The animal was created to live and to multiply. However vast may be the region which he inhabits, he will fix himself only in such places as furnish the required food and shelter adapted to his organization. A Dutch naturalist, Mr. H. Schlegel, to whom Zoological Geography is indebted for many valuable observations, states that in Sumatra, the *Orang-Outang* is always found in localities corresponding to his wants, and nowhere else. We observe often in the mountains, at various heights, different species of animals, because the zones of elevation constitute so many distinct physical regions. Each species has thus a point upon the globe, which seems to be its cradle, and from which it radiates toward the limits or conditions indispensable for its existence. However, it does not always reach these limits, because obstacles due to the character and condition of the soil, will oppose the propagation or a distant migration, for which the faculties of locomotion have not been sufficiently developed. Thus we miss the animals of the Western Cordilleras, generally, on the Eastern slope, the Andes forming a barrier, which they are unable to overcome. In the numerous islands of the Pacific Ocean, we find no serpents, although the great East Indian Archipelago belongs to those regions where they usually abound. These

reptiles were unable to traverse that arm of the ocean which separates Polynesia from the Malaijan group. It is only in exceptional cases, when they are pushed by famine and carried along by an instinct common to all individuals, that we see certain species suddenly invade regions where they never appeared before. In this manner swarms of winged, and even not winged insects, settle sometimes upon a country which is separated by mighty barriers from their usual abode. Thus the grasshoppers have traversed by myriads the channel of Mozambique, to alight at Madagascar. Other *troops* have crossed the Mediterranean, and entered through Barbary into Italy. Banks of caterpillars have endeavored to cross rivers, and butterflies have seemed almost to cover the coasts after having crossed the ocean. Yet these cases are rare, and may be viewed as a perturbation in the great laws of zoological distribution. As a general rule, the animals displace themselves less suddenly; they advance or retreat with the atmospherical changes, and regulate in each country their sojourn according to the nature of the locality and climate. Hence it is, that we find a species which inhabits the Northern plains, in a temperate country, at a corresponding height in the mountains. Thus the beautiful butterfly, called *Parnassius Apollo*, is found in Sweden on the plains and slopes, and at the same time upon the Alps, in the Pyrenees, and upon the Himalaya. It keeps only at such heights, because it finds there the temperature of the Swedish plains. Another insect, called the *Carabus auratus*, which flies over our plains, is found only upon the highest mountains of Italy.

The area which each species, depending upon the climatological conditions for subsistence, occupies, will grow or diminish, according to the changes which take place in the temperature, vegetation, and general aspect of the country. New cultures will chase away a certain animal, and attract another. The drainage of ponds or an alteration in the level of their waters, will cause trouble to the Ichthyological population. The arrival or the departure of certain species, will determine the appearance of certain carnivorous species that are dependent upon them for their existence. Since the extension of the Pine tree culture in the basin of Paris, a new insect has made his appearance, called the *lamia ædilis*, which is an inhabitant of Northern Europe, and has heretofore not been observed. Audubon, the great American Ornithologist, remarked, that the extension of improvements in the New World and the revolutions which it carries along with itself, has modified the migrations



of certain birds, rendering them either more abundant or scarce. The geese, ducks, pelicans, travel now to the North to bring up their offspring, because man has rendered for them those regions, were they formerly used to congregate, uninhabitable. Hence result migrations, and progressive displacements which daily occur under our eyes, and tend to a new distribution notably distinct from that of former ages.

The less exclusive an animal is in his nourishment, the more flexible his organization, and the more capable it is for a climatological modification, the greater will be the area over which it is extended upon the globe. It is difficult to state the precise home of omnivorous animals, and of those that possess a pliant organization; their nature is so cosmopolite that we are at a loss to name the country best adapted for their proper development. This difficulty disappears in such species, whose area is much circumscribed, and who extend but to a small distance. Their original homes are strictly traced out, and they seem very appropriately to characterize the various zoological zones. While the artful, cunning hawk is flying over almost every land, the dolphin and the porpoise are floating on the surface of every ocean, and the butterfly called *vanessa cardui* is seen in Southern Europe, Barbary, Chili, and Australia, we find that the Condor and the Lama do not quit the heights of the Andes; and the Ornithorhynchus, the most curious-looking animal that ever was created, is strictly confined to Australia. A great many species of the class of the reptiles have very limited areas, and seem to be the most appropriate animals for the determination of zoological provinces.

The distribution of the marine species is, of course, much more simple than that of the terrestrial animals. It hardly presents such anomalies upon the map, as the irregularities of a fauna. The cetacea, the sea reptiles, the fishes, the mollusks, and the zoophytes, living almost constantly in the waters, escape the hygrometric action of the air and the thousand modifications of the climate. The temperature of the sea, though still variable, is more uniform in its centre, and the animals are not obliged to retreat to a small space in order to escape hunger, heat, or cold. The ocean is like a grand liquid plain, with all the uniformity of a steppe, or desert. The causes that regulate the distribution of the marine animals consist in the nature of its bottom, and in the general temperature of the zone to which the ocean belongs. The shells and fishes change their appearance according to the latitudes and depths. Those species that frequent the submarine



banks and lower shores, differ from those in the mid-ocean. The low temperature of the waters is in itself sufficient to explain the diversity of the oceanic fauna, apparently all under the same conditions. The Western coast of America has no zoological affinity whatever with the islands of the Pacific Ocean, because the temperature of the respective waters is entirely different from each other.

The currents from the tropical zone warm up the ocean in certain directions, and cause a derangement in the natural relations, which exist between the boundaries of each species, and the degrees of latitude. Since Lieutenant Maury has furnished us, through his admirable work on the ocean-currents, with a complete chart of the rivers and streams that form themselves in the midst of the ocean, a direct road has been discovered that leads to the mode of repartition of the currents and a distribution of the mollusks and crustacea. The clever naturalist, Dana of America, has proven the evidence of this fact in an interesting work. Forbes and Löven have, through an attentive study of the distribution of the fishes and mollusks, demonstrated the fact, that the greater facility of a species, for living in various depths of the same latitude, corresponds exactly with its power of propagation upon a large surface. Thus certain species of fishes, whose area of distribution is considerable, are always enabled, by ascending or descending the ocean, to find the convenient locality for their existence, while others do not leave the quite limited region which has been assigned to them.

When the nature of the waters, at a distance of many thousand miles, and after many changes which necessarily have taken place, becomes again the same, we see that the same animal forms reappear, because a similarity of the conditions will recall the same types. The navigator, James Ross, has observed in the Antarctic Ocean several species which are found in the Arctic Ocean. In the Chinese and Japan seas are found the same species of sharks as on the shores of Australia. We must, however, bear in mind that the fishes, being endowed with a great power of locomotion, will transport themselves sometimes far beyond their proper boundaries, as the celebrated naturalist Richardson has observed. Thus we see that tropical species easily ascend towards the North, where the presence of the Archipelagos contributes much toward their propagation. If the opposite shores between Africa and America present such a vast difference in the ichthyological population, it is because these two continents are separated by

an ocean of such immense depth, and have no chain of connecting islands.

Animal life is remarkably developed in the bosom of the ocean. We find living beings at all depths, but the number of species diminishes gradually as we descend. Edward Forbes, who died too early for the cause of Zoological Geography, observed at a depth of two hundred and thirty rods eight distinct regions in the sea, each having its particular fauna. When in the Mediterranean, the second region reaches two hundred and thirty rods, all animal life disappears. With Brooke's improved sounding apparatus, an immense quantity of microscopic shells has been obtained from the bottom of the ocean, but it seemed as if the action of the currents had drawn them thither. However, the boundaries of the zoological zones are equally less distinct in the oceans than upon the continent, and while we see one species appear at a certain depth, another makes also its appearance.

Although the *Hydrophis*, or Sea-Serpent, which must not be confounded with the fabulous animal of that name, infests the Indian, Chinese and Polynesian seas, it never touches the shores of the island of Malabar. The depth of the waters and the height of the mountains influence the laws of distribution of animal life so far as to present a scale of latitudes. A mountain offers upon the various stations analogous flowers to those, which we find in travelling from the equator to the poles. And descending into the ocean, we observe a fauna which is similar to that in the Arctic seas. This demonstrates the fact, that notwithstanding the liberal space which the ocean leaves to its various species, temperature, depth, and nature of bottom will form boundaries for them as strong as our mountains, and prevent whole families from trespassing their primitive homes.

The identity of the places frequented by each terrestrial species has not yet completely been established; only the principal lines are drawn. The existence of great boundaries has been recognized, which may serve as general divisions. Parrots with naked and featherless faces do not quit the Equator, and scarcely cross the seventeenth degree of Southern latitude. In Asia the camel appears where the elephant disappears, and the latter is never found wild in Indo-China, that is, 21° 21' Northern latitude. In Asia the thirty-fifth degree is the limit for the monkey. An ape (*inuus speciosus*) is still found on the Islands of Sikof and Kiu-Siu in the Japanese Archipelago. These quadrumanes follow the distribution of the family of

Palm-trees, and when we find them so far North as Japan, it is because these great monocotyledones are the connecting link between the Pine region. In South America the monkeys disappear with the twenty-ninth degree of Southern latitude.

As a general rule, heat is favorable for the development of animal life. The rich flora of the tropical regions generally furnishes an easier and more varied nourishment for the herbivorous and fruit-eating animals, who, in return, present again a more abundant prey to the carnivorous kind. The height of the temperature, however, corresponds with a certain creative force, the law of which we are not yet able to define. Thus it is that we meet in warm countries the crocodiles and great turtles, the most beautiful representatives of the feline species, the monstrous pachydermatous animals, and the monkeys; the latter nearest approaching man. The bats or Chiroptera, unknown in the polar regions, are represented in the Indian Archipelago by a particular family, called *Galeopithecus*, whose strong dimensions and powerful organization approaches that of the makis or monkeys with a fox-snout. The ostrich and the condor, those monstrous birds, belong also to the tropical regions. The largest of the coleoptera, called the Goliath-beetle, the *copris midas*, or gigantic bucephalus, inhabit likewise warm countries. One species, whose dimensions are not less astonishing, the *mormolis phyllothus*, belongs properly to the Islands of Java.

As we advance from the Equator to the poles, fewer differences in the fauna of each zone present themselves, so that we find in the vicinity of the Arctic Circle but one fauna, which is common to all regions of ice, and beyond which life is completely arrested. These general laws, however, have their exceptions; certain species find in cold countries more proper conditions for their development, and we find them therefore represented there by the strongest and even monstrous specimens of their kind. Everybody knows the gigantic white bear, and also the Russian bear, of which there is in the London Zoological Gardens a splendid and enormous specimen, in the Prince Menchikof. The Lapland owls are the most beautiful among the night birds, and as the sky in the Arctic regions is almost constantly cloudy and overcast, these birds supply the place of our hawks. It must be borne in mind, however, that the most beautiful types of them are found in the Arctic regions, along the streams and in the midst of the ocean. Upon the continents and in the islands we observe that life

is most energetic in the tropical regions. In the ocean, the contrary takes place, the number of species increases and their organization is more perfect, as we advance towards the poles, until we arrive at the point where all animal life ceases to exist. The seals, walruses, and whales live mostly in the Arctic seas. Dana has observed that the sea-crustacea of the colder zones belong to a higher order of organization than those of the tropical seas. Those species of the Arctic zone which present such a superior organization, degenerate as we approach the tropical regions. In the Arctic seas, where the waters possess a perfect transparency, we find often spaces, amounting to twenty or thirty square miles, and more than fifteen hundred feet deep, which swarm with animalcula to such an extent, that Scoresby estimated it would require five thousand persons and twenty thousand years to count the contents of two kilometer and a half of water. While thus life is deserting the continents, as we approach the poles, it becomes more luxuriant in the bosom of the ocean, because the waters of the sea are, on an average, of a higher and more uniform temperature, and possess therefore more favorable conditions for the development of animal life.

When we consider the harmony of the types composing the animal kingdom, their division into two principal classes, a tropical and a subpolar one, becomes evident. The warm and the cold zone appear then as two poles in the fauna of the globe, and in each country only such characters will prevail, as are consistent with the special temperature thereof. We must, however, not suppose that the genus and species will always preserve their characteristic features so as to permit a ready recognition of their tropical or polar origin. The animals of the intermediate regions present also their peculiar characters, and some species are found only here and there in the temperate regions. This arises from the fact, that types degenerate and change as they remove from the regions for which they seem to have been created. The tropical species degenerate as they advance toward the North or South Pole, and the same result takes place when species from the Northern or temperate zone approach the tropical regions. And this fact, to which we wish to call attention, enables us often to determine which of the two opposing regions has been the birth-place of certain animals. If the human race springs from but one source, and every thing tends to support this idea, we must conclude from its degeneration in the tropical and polar regions, that its origin belongs to a moderate zone, from which it

has spread in two opposite directions. Man then belongs to the category of subpolar types, in contradistinction to the monkeys, which unquestionably have to be classed under a tropical one.

The variations which the zoological types undergo, as they remove from their primitive homes, account for the appearance of intermediate species, which change themselves incessantly according to the special conditions under which they develop themselves. Neighboring countries do not always present radically distinct Faunas, and we pass thus unconsciously by degrees from one fauna to another. Genera, even identical species, reappear upon the vast continents, and show but slight differences characteristic to local varieties, and due to particular influences. The jackal of the cape (*canis mesomachus*), for instance, is replaced in the more Northern parts of Africa by a variety a shade lighter, and without black spots upon its back (*canis variegatus*); the deer and the buck of the cape differ from those of Northern Africa merely by more marked spots; the genet of the cape, which inhabits also Spain, is replaced in the Senegal and in Abyssinia by a variety which is a shade lighter. In the place of the Egyptian ichneumon we find, at the Eastern extremity of Africa, a local variety with a darker hair. Each portion of Africa has also its special variety of antelopes. Our raven is replaced at the Farö Islands by a variety with grayish plumage. Thus we could cite examples to an indefinite number.

The regions of our globe present more marked differences as we traverse them by latitudes, than by longitudes. Hence, a corresponding effect is produced upon the variation of species. If we pass beyond the Equator, we do not find always in the Eastern zone the same genera, and vice versa, although the zoological characters seem to be the same. The analogies of the genera and species seem to be more striking as we proceed by isothermal lines of longitude. We meet not only identical genera, but the species appear to be absolutely alike.

The variations of the specific characters are so numerous and so diverse in their extent, that it seems very difficult indeed to say whether we have new species before our eyes or merely local varieties. Even the naturalists themselves are far from being united upon the number of species, and while one party recognizes but a small number, the other creates constantly new species, and subdivides the animal races into an infinite number. This uncertainty augments the difficulties in Zoological Geography, and shrouds the solution with

a crowd of primitive questions whose solution is indispensable, before we can form an idea of the mode of distribution of the animal creation. If we multiply species, then we are compelled to admit new centres of creation, and the modifying action of climate and country becomes less admissible, the influence of which, however, is beyond dispute.

II.—Nothing seems to oppose the idea of a great number of centres of creation, provided the fauna had always been what it is at the present day, and that all animals made their appearance at the same time. Paleontology, however, teaches us the contrary. She informs us not only of species extinct centuries and thousands of years ago, but also that the distribution of genera and species, as found actually at the present day, has been different in previous ages. In abandoning the idea that animals were destroyed in consequence of immense inundations and convulsions in order to make room for others, geologists have been brought to the understanding, that during the long periods which have passed, changes have gradually taken place in the division of the continents and seas, and consequently also in the establishment of local climate. The animals of one epoch which have escaped the slow causes of destruction of a preceding epoch, have continued to exist as heretofore, but under a different distribution. There is no doubt, that as we have approached the present period, the movements of the soil have become softened and simplified; nor have any fundamental changes taken place. Hence, an uninterrupted succession of migrations and displacements, ending with the contemporaneous order of things, which is far from being permanent.

If we would comprehend the actual distribution of species of animals, we must return to past ages, and especially to the quaternary and tertiary periods which have immediately preceded ours. It is true that in the course of each period, new types have made their appearance. Animals unknown to the primitive ages have followed those which, by the progressive revolutions of our globe, were removed. The quaternary period, often called also, but improperly, the diluvial, has left in various points upon the surface of our earth numerous deposits, which prove its existence and duration. Formerly, these deposits were examined en masse, and thus the different ages have not been distinguished. But now the quaternary period is divided generally into two great phases, or, as the geologists say, strata. Mr. Scipio Gras, a French mining engineer, who



paid particular attention to such formations, counts in France three such strata. Mr. D'Archiac, to whom we owe an interesting history of the progress of Geology, counts, of the quaternary period, five strata, of which three have been of a long duration. Whatever these divisions may indicate, it is quite sure that the quaternary period embraces vast and general changes. Elevations in the level of the sea have been slowly produced, and have receded in like manner. The oscillations of the ocean and of the continents have been the cause of atmospherical revolutions. The ancient torrid and uniform temperature of our globe was followed by alternations of cold and warm. Immense glaciers sprung up and pushed before them the erratic blocks. The melting of the ice caused vast inundations. Monstrous ice-blocks kept the balance of detached rocks upon the waters, and mighty rivers formed beds for the transport of alluvia. How could, then, the zoological condition of our earth in the presence of such phenomena, remain permanent? The configuration of the continents did not present such an appearance as we observe since the historical epoch. In Europe, for instance, nothing resembled the state in which we find it at the present day. England was connected with Ireland, and united with Germany, by vast plains. The arm of the sea, called Canal de la Manche, was not yet formed. This strait was the result of successive depressions whereby the extent of the Northern ocean was diminished. This ocean once extended as far as the Alps and the Ural Mountains, and covered even a portion of the British Islands. Even Sicily seems to have been connected with Africa. Such a configuration naturally must have determined a very different distribution of animals from that which we have now under our eyes. Paleontology actually proves that during the quaternary epoch, thousands of generations have successively developed themselves from the various kinds of mammals. There was a fauna of land-mollusks and one of fresh water-mollusks, of which various species of the most delicate forms have been perpetuated to the present day, and appear in about the same geographical distribution as before. Out of the fifty-seven species found in the earliest deposits of the quaternary period, fifty-four are still among the living. Europe has thus several times changed its animal population during the period preceding the present one, and every circumstance tends to prove that these changes correspond with the changes in the outlines of the various other continents and oceans.



We are indebted to Mr. Lartet for some curious researches upon the migrations which have once taken place among the mammals of Europe. This savant has proved the existence of two distinct faunas during the quaternary epoch. In one we find the African elephant, the rhinoceros of the Cape with two horns, two species of hippopotamus, the lion, panther, serval, the striped hyena, the hyena of the cape, the genetie, the porcupine, the boar, and the antelope. These animals have once inhabited our regions, but the changes which gradually followed, have compelled almost all of them to emigrate to Africa, where we find them at the present day. A few of these tropical species, however, have remained in the temperate parts of their ancient home, like the magot or ape around Gibraltar, the genetie and the ichneumon of Spain. They appear like the stragglers of a great army which penetrated as far as South Africa. It is probable that the porcupine, the boar, the dormouse, the sheep, and the goat, are also the remnants of that ancient European fauna. This migration was effected on the line of the Meridian, and the distance between the two extreme points which certain species inhabit, is not less than eighty degrees in latitude.

The second division, as established by Mr. Lartet, presents us the fauna which succeeded the tropical population of Europe, and supplied it with the greater portion of the actual mammals. The temperature of our regions then must have lowered remarkably, to enable the animals which inhabited Siberia, in the preceding period, to advance as far as the centre of Europe, and to traverse a longitudinal distance of seventy degrees. While France, Spain, Italy, Germany, and England began to lose these enormous animals (proboscidiens) which lived there since the tertiary period, an elephant belonging to the Northern climate, the *Elephas Primigenius*, spread himself over that country until we now find his remains in the diluvial deposits. Other proboscidiens have disappeared long ago, as we do not find them after the miocene period, nor in the pleocene which followed it. These are the dinotherium and the mastodontes, both numbering several species. With the Siberian Elephant lived other pachydermous animals, as the *Rhinoceros tichorhynchus* and various other Northern species, the musk ox, the reindeer, the glutton, and the lemming. When the climate of Europe became more temperate, these animals, which penetrated even to its heart, returned to higher latitudes. The large species, however, could not, by this retrograde movement, escape destruction, with which the gradual

elevation of the temperature threatened them. They perished, of course, and only their bones prove to us their ancient existence. Among them were the *Elephas Primigenius*, the *Rhinoceros tichorhynchus*, *Cervus giganteus*, *Bos Primigenius*, and the *Ursus speleus*.

Although these two European populations are separated by two distinct characters, a tropical and an arctic one, yet it is evident that they must have lived for some time in bordering countries. That portion of the globe which we now inhabit, was subject to such extremes of temperature, that individuals of very different faunas were enabled to live there together. Thus we find often in the quaternary deposits, the remains of tropical animals associated with those of Northern climates. The fluviatic deposits, or the grays, of England, contain the remains of a hippopotamus and of a macacus ape, which must have lived on the shores of the Thames long after the various species of the arctic shells were driven to the Central European oceans. After the first glaciary phase, the musk ox, the lemming, and the reindeer, together with the elephant and rhinoceros of Africa, now exclusively belonging to the arctics, lived in the centre of Europe. These animals were, probably, prepared for the considerable changes in the temperature, by a corresponding outfit in their skins and a modification in their muscular construction. There exists such a harmony between the climate and the organization of living beings, that an acclimated individual finally acquires, through an unexplained action, the character and appropriate instinct for his new home.

Hence, we perceive that the actual fauna of Europe is a mixture of previous faunas, and the consequence of displacements which have taken place. New displacements, however, are preparing, because events happen now as they did myriads of years ago. Species became extinct, or abandoned their ancient habitations almost under our own eyes. The DODO, that queer looking bird from the Mascareign Islands, has for several centuries ceased to exist. The Urus, who wandered about the forests of Germany in the times of Cæsar, has gradually disappeared with them; the elk, described by the ancients in the middle of Europe, inhabits it no more. In vain would we look for the beaver in France and England, whose rivers he once frequented. The lynx is almost unknown in the Alps, and has completely deserted the Pyrenees, where he used to be an object of the chase in the fifteenth century; the panther who ravaged Asia Minor in the times of the Romans, has flown to very dis-

tant regions ; the lion, so much dreaded by the ancient Assyrian people, belongs no more to the basin of the Euphrates. Man has been the principal cause of the disappearance of these animals. He has either destroyed or displaced them ; he will destroy a good many more wild species, because civilized man annihilates whatever is incapable of assimilation ; he deals with the beasts in the same way as he does with the savage races, whom he exterminates if he fails to effect their civilization.

Hence, we may suppose, that various extinct species once existed with our race, and we must not be astonished if we find human bones, or objects made by human hands associated with the fossils of extinct Mammalia. The mastodontes, of which one species, the mastodon of Ohio, and two species of the elephant inhabiting America in the quaternary period, may have been the contemporaries of the early tribes which peopled the New World. These animals were remarkably numerous, for at Big Bone Lick in Kentucky, have been discovered the remains of a hundred mastodontes with about twenty Mammoths, (*Elephas Primigenius Americanus*), together with other fossils, as the megalonyx, deer, horse, and the bison. If we can believe the traditions of the Shawnee Indians, these gigantic pachydermous animals once frequented their forests, and were annihilated by heavenly wrath. In Siberia, man seems to have lived at the same time with the *Elephas Primigenius* and the *Rhinoceros tichorhynus*. The *Bubalus* of Siberia, which exists only in a fossil state, reminds us of the *Bubalus Caffre*, which is still living at the Cape. He is almost the same as the *Bubalus moschatus* or musk ox, which was found in the farthest Northern countries in Melville and Baring Islands. Such is the opinion of Mr. Owen, one of the most eminent naturalists of England.

The most recent discoveries begin to verify these statements. In the environs of Amiens and Abbeville, (in Picardy in France,) hatchets of silex have been found in the quaternary portion, which evidently were carved by man. Mr. Boucher de Perthes has several times pointed out the existence of carved silex in the so-called diluvium. These vestiges of human industry are found associated with the remains of the *Elephas Primigenius*, *Rhinoceros tichorhynus*, *Bos priscus* and *Hippopotamus*. The reality of these silex repositories cannot be contested any longer. Several English geologists, among them Mr. Joseph Prestwich, Mr. Falconer, and Sir Charles Lyell, went to Picardy in order to verify the fact, and they

gave a most striking testimony of all which Mr. Boucher de Perthes supported for more than twelve years. The Geological Institute once appointed a commission to examine the objects which the savant of Abbeville had collected in the diluvium, and ordered that the quarries of Abbeville and its faubourg, Saint-Acheul, should be visited. This commission, unfortunately, contented itself with the examination of the hatchets without digging into the ground. What the Institute failed to execute, a young naturalist, Mr. Albert Gaudry, to whom we are already indebted for many excellent works, has accomplished. Penetrating into the quarries of Saint-Acheul, which are thirty-three metres (99 feet) above the level of the Somme, and crowned by a little hill, he could easily ascertain, through the normal position of the layers, that human hands had not disturbed the soil in these localities. He caused the place to be excavated to a length of seven metres, (twenty-one feet.) Then the banks were cleared of the clay and conglomerate, which covered the spot subject to examination. These banks are not higher than two metres, (six feet,) and the covering one metre, so that Mr. Gaudry's exploration began, in fact, at a depth of three metres below the ordinary soil. In the upper strata no hatchets nor any other carved silex were found; an important point, because it is in uniformity with previous observations. As soon as the white diluvium which rests upon the limestone was reached, the hatchets made their appearance. Mr. Gaudry gathered them himself in a gravelly bank, one metre below the level of the stratum which contains them. In that same bank the fossil bones of *Bos priscus*, a species much larger than the ox of the present day, were discovered. In the neighborhood of the village Saint Roch, at a small distance, these hatchets were found together with the bones of the primitive elephant and rhinoceros. At Hosne (Suffolk) in England, an examination of the country of a similar formation as that near Amiens and Abbeville was made, and the same fossil bones and carved silex stones were discovered.

Thus have the doubts, which a majority of the geologists have raised against the correctness of these observations, been dispelled. Man has left behind him the proof of his existence at an epoch, the antiquity of which we are as yet unable to calculate. It is beyond all provision, and contradicts even the historical inductions. These axes could not have been brought from any distance, as their edges are not dull at all. They show us human society in a very primitive state, and at an epoch when the use of metals was not yet known. Man has

then inhabited Europe together with these enormous pachydermous animals and giant ruminants which have disappeared from our globe in consequence of the revolutions through which it has passed.

These discoveries must attract the serious attention of all learned men to those ideas which Mr. Nilsson patiently entertained for several years. This Swedish naturalist has made curious inductions upon the condition of the ancient aborigines, from the examination of the quaternary deposits in that peninsula. Geological observations have demonstrated that the Northern portion of that peninsula is rising in proportion as the Southern end is sinking. The ocean has thus probably gained from Gothia, whence we must conclude that the southern part of Sweden was once connected with Denmark and consequently also with Germany, while the northern part still remained under the ocean. It was when Scandinavia formed part of the continent, that she received the great herbivorous animals, whose bones we find embedded in the vast turf-pits of this province. Then came the carnivorous species which pursued them. Man must have existed in that epoch, because, upon the fossil skeleton of a *Bos priscus* found near Lund, the impression of an arrow was discovered with which it had been killed. In another turf-pit of Scandinavia the skeleton of a bear was discovered, buried under a heap of gravel in which the remains of very ancient and very rude implements for fishing and hunting were found. The arrows and fish-hooks were made of bones and stones, like those which were found in the ancient tumuli of Scandinavia, made also of ancient stones and almost in every instance pointing to the South. Mr. Nilsson concludes that these tumuli contain the bones of the first inhabitants of Scandinavia, because the form of the skulls dug up from these rough stone masses is indeed very different from that of the Gothic race. These skulls are remarkably short, broad, and flat on the hind-head, with prominent parietal bones, all of which reminds us of the osteological character of the Laplanders and Samoyedes.

The existence of man can thus be traced as far back as the geological epoch which preceded the present one, and Mr. Littré has endeavored to demonstrate it in an interesting work published in 1858. In the presence of such facts as have been observed by Mr. Nilsson the question arises whether Sweden had not for many thousand years been peopled, and whether the fossil human bones discovered by Mr. Lund in Brazil, and mixed with various fossil animals of extinct species, do not date from

an epoch which is anterior to all time of which history speaks. Whatever may be said about it, man, of the primitive ages, must have followed the animals in their migrations, and has probably hastened their destruction. His arrows, his tomahawks, and his stone axes, have killed all those that troubled his habitations, making them serve ultimately for food and raiment. In the turf-pits of Ireland, where we often meet with the remains of the primitive elk and the extinct giant deer, the shoulder-bone of one of these ruminants was found with a perforation which certainly must have been made with some pointed instrument. That the animal was struck while alive, was demonstrated by the effusion of calus or new bony substance which could only be produced by a protracted continuance of the murderous weapon in the wound.

In the habitations erected on piles, of which the vestiges were found in considerable numbers on the lakes of Switzerland, animal bones were found scattered among charcoal and other calcined objects. These structures are unquestionably of very great antiquity, because no other arms but those of silex and fragments of very rude earthen vessels, as used by the savages in their gloomy habitations, were found. We find there also the vertebra of the giant deer of the quaternary epoch, which has disappeared from Switzerland and Ireland, and must have been in one or the other country contemporaneous with man. The nature of the country then, and not the species of animals, will enable us to judge of the antiquity of these vestiges, because we have been shown that since the historical epoch many species have become extinct. In 1849, were discovered amidst the Roman ruins at Colchester, the horns and the skull of the *Bos longifrons*, which, although unknown at the present day, must have lived in England at the commencement of the present era.

The extinction of an animal species, however, is necessarily not always testimony of primitive age. We are very apt to go, for the explanation of events not visible to us, into far distant periods. If man was one of the causes of extinction of these giant species, of which the quaternary formation preserves the fossils, he was not alone. There are many agencies for the destruction of animals. The different species keep up a war against each other as bloody as that which man wages against them; they devour each other, and a whole species is liable to become the victim of the many carnivorous animals that pursue them. The black rat of England has almost entirely disappeared under the pursuit of the gray species of Hanover,



which was carried over the Channel by the vessels of William III. Certain animals possess such ferocity that in a very short time they spread gloom over that portion of the country which they inhabit. Such a ferocious specimen is the lynx, now driven from our mountains and only seen now and then through the barriers of a cage, exhibiting the ferocity of his nature. Mr. F. Castelnau estimated lately, that in the small Island of Singapore, the tigers destroyed annually seven hundred victims. What must have been the annual destruction of herbivorous animals at a period when the carnivorous species were so abundant everywhere. The herbivorous species fight also fiercely among themselves, causing thus many victims. The rhinoceros is the sworn enemy of the elephant, and giraffes, apparently so good natured, attack each other with their hoofs so fiercely that frequently one of the combatants succumbs.

These battles fought for the possession of prey or pasturage, may have gradually reduced the number of individuals. Famine and extraordinary cold, were sufficient to cause the entire extinction of a race. Thus the anteater is perishing since the ants became scarce, and whole tribes of migratory birds drop lifeless to the ground either for want of food or from exhaustion. The violent currents of the quaternary period suffocated many animals in their rolling torrents. Thus perished the elephant and the other great mammalia, whose bones abound in the almost uninhabitable islands of Lachow and New Siberia. Some of the elephant skeletons discovered upon the Arctic shores, were found in a standing attitude. A German Savant, Mr. Brandt, thought he recognized, from the condition of the blood-vessels on the head of a rhinoceros *tichorhynus* from Vilui, that the animal was suffocated through an immersion. These great pachydermous animals have thus lived in that Northern climate until the rush of the waters and the effects of cold have caused their disappearance. We find in the cavities of their teeth the particles of food incrustated, which proved to have been the bark of trees which once covered the surface of Siberia. These animals have, unquestionably, for a long time braved the attacks of a rigorous climate, until the vital conditions were exhausted and their extinction became complete. The same thing happened undoubtedly with other kinds of animals. An extraordinary fall in the temperature kills the eggs of insects which have taken refuge either in the bosom of the earth or in plants; it benumbs gradually the reptiles, and and at last causes death itself.

It is, therefore, not necessary that great cataclysms or



violent and unexpected ruptures should have taken place, to account for the destruction of all the animals which have preceded the present epoch. Has also a primitive race of men with these animals disappeared? We do not know. If such an event took place, it was the result of an uneven fight with a stepmotherly nature, which man had to wage from day to day for the sake of subsistence and reproduction.

III.—When a species is once destroyed, or a certain type annihilated in a country, it seems as if it never could generate again, even if the conditions were of the most favorable character for its existence and development. It requires that a species which has thus disappeared, is brought there from some other point of the globe where it existed. Contemporaneous facts demonstrate the reality of this law, and if we examine the results of the present period, we shall see that such has been the case from the beginning. Mr. Lund has discovered in the calcareous caverns of Rio das Velhas, in Brazil, the bones of a horse together with those of extinct species, or such as are found in other parts of South America. The horse, then, must have previously inhabited that great continent and disappeared afterwards from it. Those great plains of the La Plata valley seemed to have been created in vain; the horse did not make its appearance there until the Portuguese introduced it; whereupon it spread with incredible rapidity in a country that possessed for its development the most favorable conditions. The same result happened with the ox and with the goat. A phenomenon of an identical character may be observed daily with the plants. A certain species once brought to a country, spreads there with such rapidity that it gradually assumes the character of an indigenous plant.

The area occupied by animals is also liable to variations, which depend upon the possible return of a once extinct species, and can either be extended or limited. Should the conditions, for the existence of a species or the perpetuation of a certain type, gradually disappear from the surface of the globe, a proportional diminution of the extent of that species will be the consequence, until it is confined merely to a small spot. Hence it follows that the remains of ancient types found in particular localities, are not to be taken for local creations, but must be regarded as the last remnants of a disappearing fauna. We know that in the ancient geological formations, particularly in the Lias which is the basis of the Jurassic formation, the Saurians were very numerous, while at present there exists but

a single marine lizard, called *Amblyrhynchus cristatus*, about thirty-eight and a half inches long, and very common in the islands of the Archipelago of Galapagos.

The *Amblyrhynchus cristatus* is thus the last of the degenerated erpetologic fauna of ancient times. That animal prospers in the Archipelago of a southern sea under conditions which prevailed thousands of years ago, upon a vast extent of our globe, and has therefore been preserved. The Lama, living to-day only upon the Andes, has left his fossil bones in the grottoes of Brazil to testify his former habitation. The crocodile, the sloth, the hippopotamus and the rhinoceros, seem to be the last representatives of an ancient fauna. The same thing can be said of the birds, particularly of the condor and that strange family, the casuars, which are found in Western Oceanica, and have preserved the ensemble of their original types. That odd-looking bird, the *apteryx*, without wings and tail, resembling the hedge-hog, (herisson,) gathers his food at night-time, and seems now an animal altogether isolated in creation. The study of the fossils of New Zealand, however, teaches us that this bird was once very numerous with other giant birds in the Polynesian Islands. The *dinornis* or *moa* of the Kanaks has left behind, in the marshes, some of his remains, which seem to confirm the idea of the natives, that this monstrous bird lived on this island at a not very distant period.

The ostrich, a not less remarkable bird than the struthio of New Zealand, and forming about the dividing line between the quadrupeds and birds, appears to be the last descendant of the family of marching birds who inhabited our regions in the tertiary epoch, as it demonstrated by the discovery of the fossil remains of *Gastornis parisiensis* in the environs of Paris. This bird, according to the observations of Mr. Owen, much larger than the ostrich, disappeared since the miocene period. The bustard, however, which has become more and more scarce in France, is the last degenerated representative of this strange ornithological creation.

Where we observe no changes in the types and no considerable modifications in the species, we must admit that no change has taken place in the biological conditions. Mr. Lund has found in the caverns of Brazil, among the fossils of extinct species, the remains of *Didelphs*, *Edentes*, *Tapirs*, and *Bats*, very analogous to those which are found in South America at the present day. The prevalence of the *Marsupials* characterizes both the paleozoical and the present fauna of Australia, but the number of

species corresponding with the divisions of the mammalia and their types, were much larger. Here again is a sort of degeneracy manifested. The special faunas, which appear to some naturalists as comparatively recent creations, are, on the contrary, the proofs of an ancient distribution of animals, or the last representatives of fast disappearing types. Thus a study of the fossil conchylia and mollusks, teaches us that the actually scarce species have been quite common in previous ages.

We must therefore look for the origin of the present distribution of animals and plants to the anterior distributions. As human society is composed of more or less ancient families from various countries, so the fauna of a country embraces species of different ages and from various points. Some of them, although spread over a vast extent, have but recently made their appearance. They are like the newly created nobility. Others, confined to some corner of the globe, date from a high antiquity. They recall to us the noblemen of the old stamp, whose ancestors once spread over the country, but now live retired in their ancient manors. To obtain an exact idea of the causes which have governed the actual distribution of the species of animals, it would be necessary to construct a map of our earth for each epoch, and the handsome historical atlas of Spruner should reach to the primordial ages; then, perhaps, many of the anomalies might be explained and the reason found for the singular mixture, which now present to us certain local fauna. But what an immense amount of research would the solution of this question involve! All the present and past species would have to be enumerated, and the distribution between one and another exactly determined. The acclimation and the increase of domestic animals, whose existence can be traced to very ancient times, cause more and more important disturbances in the natural fauna. The earlier human migrations from Asia to Europe, introduced certain mammalia and birds which became domesticated. This extended even to insects and parasites. The study of the words by which Indo-European nations endeavored to designate the nature of various animals, furnishes some aid towards a solution of this question. Mr. Ad. Pictet, whose name stands prominent in Paleontological science, has substituted for the observation of fossils the study of radical Sanscrit names. In his work, entitled "*Les Origines Indo-Européens*," he has succeeded in retracing the cradle of the domestic species, by taking etymology for a guide. But when we compare the species which have emigrated in ancient times with those that probably will emi-

grate in the future, these Asiatic species appear small in number. Comparative philology, however, could furnish additional light upon a problem whose solution Mr. Pictet has attempted in such an ingenious manner.

Formerly, physical causes chiefly determined the revolutions whereby the species were compelled to seek a new home.

In our days, however, it is principally man that causes the displacement and destruction of the animals. He has therein substituted himself for the causes of nature, and by and by transforms the place where he was born. This incessant action of humanity upon earth and the rest of creation, will cause a particular order of phenomena. Transforming, modifying, and combining intelligences, will, in future, take the place of fatal, irresistible cosmical forms, and call into service immutable principles for the production of new effects. The early geological epochs seem the prelude of a drama which had commenced but a few centuries ago, and which is the preparatory action for humanity to plant its empire. Man, the master of the earth, the king of the animals, endeavors now to efface the vestiges of the primitive state in which our globe appeared at the time of its creation. Man changes the fauna and the flora ; he produces artificially, varieties which he perpetuates and improves ; he destroys all that is spontaneous and primitive ; he desires, properly speaking, that all should pass through his hands, and that nothing should live beyond his influence. Proud of his destiny and almost ashamed of his origin, he annihilates this savage, frightful, but nevertheless, grand and energetic nature, in the midst of which he was thrown a frail and miserable creature ; he cleans the last spots of that clay out of which God has created him !

Thus nothing is immutable in the universe, nothing is permanent except the laws which govern it. Their continued action is producing constantly new effects. If Paleontology shows us that new creatures have gradually replaced those which have disappeared, Zoological Geography teaches us that the distribution of animal species, which has experienced so many changes is destined to pass through many more vicissitudes.

VII.—*The Origin and Progress of Statistics.* By JOSEPH CAMP GRIFFITH KENNEDY, COR. MEM. A.G.S.S., Superintendent of the United States Census.

Read December 1, 1859.

THE human mind dwells with satisfaction upon ascertained results, and finds true enjoyment in the contemplation of truths which evince a progressive knowledge respecting the real condition of the human family.

Theories, by exciting the mental faculties, create an interest according to the novelty or magnitude and importance of their topics ; but, based as they are on uncertainty, exercise only, but do not satisfy the mind, which finds repose in truths alone ; a repose more or less affected by the degree of confidence with which we are enabled to determine what is truth, particularly in its relation to ourselves.

Disturb the mind with doubt or harrow it with uncertainty, man's convictions afford but little real comfort, and however correct they may be in the abstract, they yield but little pleasure, while their weakness deprives him of the ability or disposition to exert an influence by the impress of his sentiments upon others. Fanaticism may inspire confidence and courage, but its influence is apt to be temporary and limited. With regard to matters of conscience, and the determination of truths respecting religious trust, the same *force of conviction* as would naturally arise from actual demonstration, must exist to inspire faith and confidence, but conclusions in that case rest, in the nature of things, upon what is not susceptible of demonstration by any appeal to facts, and the mind settles upon what it deems most consistent with its convictions of a superior Providence and its relations to humanity upon tradition or Divine Revelation, calling into play the ~~convincing~~ *confuting* influences of *comfort* faith. Religious convictions force themselves upon the belief because of our relations to what we know to be true. Man perceives himself infinitely above all other creatures which inhabit the globe he occupies ; he realizes that all created things are constructed for his uses, and discovers his ability to overcome all physical obstacles to the attainment of his wishes, while he has not the power to construct or create the most trifling object in nature ; himself the work of an intellect or force as immeasurably above his own as his is superior to those beneath him. He can tunnel mountains which the concentrated energy of the world could not raise ; he can make rivers subservient to his

uses and span them with an arch, but cannot create a rivulet ; he perceives a vast luminary cheering successive generations with undiminished light and heat, and the harmony and uniformity of creation maintained for ages for him alone, realizing at the same time that he is but as a speck upon the earth, the memory of which departs from the knowledge of men centuries before other objects formed centuries in advance, show signs of decay ; while the earth itself which we inhabit is but an atom in comparison with what we know of the rest of creation. With such truths patent to the observation of every one of ordinary comprehension, and perceiving illustrations in nature harmonizing with the cheering idea, man deduces the conviction that he is the creature of a higher power who controls his destinies, believes in a future existence, and hopefully settles upon some form of natural or revealed religion, according to surrounding circumstances. How beautifully Cicero in his *Cato*, or essay on old age, illustrates this sentiment in speaking of the soul :—"Her native seat is in heaven, and it is with reluctance she is forced down from those celestial mansions into these lower regions where all is foreign and repugnant to her divine nature. But the gods, I am persuaded, have thus widely disseminated immortal spirits and clothed them with human bodies, that there might be a race of intelligent creatures, not only to have dominion over this our earth, but to contemplate the host of heaven, and imitate in their moral conduct the same beautiful order and uniformity so conspicuous in those splendid orbs ;" and also wherein he quotes, on the authority of Xenophon, the dying expression of Cyrus—"For my own part," declared that great man, "I never could be persuaded that the soul could be properly said to live while it remained in this mortal body, or that it ceased to live when death dissolves the vital union." Socrates, Plato, and other great men of antiquity, whose opinions have been handed down to our day, expressed similar ideas. Thus religious convictions fill a void in the human mind, but the confidence with which they are entertained is inspired by different considerations from any which would govern the belief on other subjects, because the same evidence is unattainable ; yet there must be confidence to insure enjoyment. Truth, with respect to all the affairs of life, is that at which intelligent beings aim, and where it can be attained, none but perverted understandings are satisfied with any thing short of it ; and that study or science which tends to deduce the truth with respect to what most directly concerns life, property, the promotion of happiness, and the alle-

viation of misery, might well claim man's respect and national care. Such is the aim and tendency of statistics. Whatever tends to prolong life not only serves to extend the most precious boon, but promotes the enjoyment of its entire duration, for whatever conduces to the healthful preservation of the human system to that period when nature imperatively demands her own, contributes to relieve us from life's besetting ills and disquietudes, and renders us the more susceptible of real enjoyment and of fulfilling the design of our creation.

While statistics do not profess to heal diseases of the body or the mind, the unerring certainty with which they instruct mankind of the existence of remedial causes, leads to the investigation of their origin, and lays open defects, which, when exposed, may be said to be in a fair way to be abated or remedied. To statistics are we indebted not only for the knowledge of such a result, but for the fact itself, remarkable as it is, that "the same number of persons which in the early part of the eighteenth century produced one hundred and six deaths in England, furnished only sixty-six deaths per annum at the commencement of the present century, and twenty years later only sixty-two," reducing the mortality two-fifths in the space of a century. Statistics develop the real condition of the human family, taking the place of vague and unwarrantable ideas whereon absurd theories were established, and which, by diverting the mind from truths, and wasting the intellectual energies of man upon illusions, threw discredit upon knowledge itself. Their object is the amelioration of man's condition by the exhibition of facts whereby the administrative powers are guided and controlled by the lights of reason, and the impulses of humanity impelled to throb in the right direction. Viewed in its application to every man personally, or to the amelioration of the condition of the human family, this science presents the strongest claims to our consideration, and on the principle involved in the admirable declaration of Cremes to Menidemus in the drama of Terence—*Homo sum; humani nihil a me alienum puto*—this study commends itself to the attention of every Christian and philanthropist.

We may seem to make slow progress in developing the utility of statistics as the results flow from our social or individual efforts, but we can afford to pursue the slow and laborious process of experimental investigation and mathematical deduction, and patiently witness the apparent triumph of short-lived theories, in view of the certainty and utility of our results.



Although moral statistics are of comparatively recent origin, they have accomplished more in the last half century for the alleviation of misery, the prolongation of life, and the elevation of humanity, than all other agencies combined—they are the practical workings of an elevated Christianity.

Statistics have been termed the science of social facts expressed by numerical terms; their object the knowledge of society, considered in its elements, economy, condition, and movements.

The basis of Political Economy, the contributor to Geography, and indispensable to History, they present this marked difference, that while the battles, triumphs, and conquests of the latter are its most attractive features, the former best fulfil their mission under the blessings of peace. The mere numbering of the people is an institution of great antiquity, whereof we have the first example recorded in Holy Writ, in the enumeration of the Israelites, while, through all ages, except when barbarism prevailed, history has left examples of such investigations, very different, however, in character and aims from some which distinguish the nineteenth century. Although occasional resource has been had to statistics by all civilized nations when peace permitted and prosperity seemed to recommend it, we find they have often had to struggle for an existence, and not unfrequently had their revelations altogether obliterated and their developments smothered when their truths indicated mal-administration or registered decay. Thus we learn from history that the alarming diminution of the French population, occasioned by the revocation of the edict of Nantz, was purposely concealed, and that the statistics of France instituted by Louis XIV., after the treaty of Riswick, and fostered by such men as Colbert and Vauban, were abandoned after the disasters of Hochstadt and Ramillies, only to struggle feebly into life and immediately to die, until deemed necessary by the first emperor to register with figures the greatness of his conquests and the success of his arms, to find a grave with his misfortunes, only reviving again in 1833, never, we hope, to be again obliterated.

With these preliminary remarks, I will, for a little time, endeavor to occupy your attention with some account of the statistical investigations of different peoples, with a view to apprehending the cotemporaneous progress of Statistics.

Among the Greeks, Romans, and Egyptians, the enumeration of the people was no unusual thing. By reference to Dionysius of Halicarnassus, Book I., c. 84, it will be seen that he establishes the data of the irruption of the Gauls, in which

the city of Rome was taken, and from that the date of Romulus, which he says appears "particularly by the records of the censors, which were transmitted with great care, in which I find that the year before the taking of the city, there was a census of the Roman people, to which there is affixed the data, which is this—'In the consulship of Lucius Valerius Potitus and Titus Manlius Capitolinus, the 119th year after the expulsion of the king.'" The same author, in his fourth Book, ch. xv., describes the institution of a festival termed *Pagnalia*, to which the entire population contributed each a certain piece of money, differing in amount as to men, women, and children, and of which he says, "when these pieces were told by those who presided at the sacrifices, the number of people, distinguished by their age and sex, became known." Not only did Servius Tullius establish this ingenious method of at once improving the treasury and taking the census of the living population, but he instituted a plan for ascertaining the number of births and deaths, and the time at which every male person arrived at the years of manhood. In his history of Laertius, the first dictator, he refers to the revival of this, "the wisest of all the institutions established by Servius Tullius, the most popular king," in order "to register the valuation of their fortunes, adding the names of their wives, with the names and ages of their children, and their own age," Book V., c. lxxv. The last lines of this renowned writer which have reached posterity, relate to this institution, and the eightieth chapter of his eleventh book abruptly ends while describing the demands made to the senate for the re-establishment of "particularly the most necessary of all, the custom relating to the census," which had been disused "for seventeen years since the consulship of Lucius Cornelius and Quintus Fabius." Livy, in the first book of his History of Rome, bears testimony to the importance of the census as established by Tullius, which he terms "an ordinance of the most salutary consequences in our empire." This author also refers to the census combining a survey and description of all the lands and houses, and the entire revenue of the Roman people, (B. c. 440.) In his twelfth book the same author refers to the survey of the twelve colonies presented to the senate by the censors. Tacitus mentions a census in the handwriting of Augustus, which contained an exact account of his dominions. The learned French statist, Moreau de Jonnes, gives the details of the Roman population for thirty-six censuses, extending through a period of near eight hundred years, from the time of Servius Tullius to that of Vespasian, and re-

marks that "no people of modern Europe presents an example of arrangements so numerous as those made at Rome from the earliest times, to ascertain by periodical enumerations all the details of her population, and the changes that occurred in its condition from one year to another."

In the first book of *Cæsar's Commentaries* (chap. 21) we learn that when that general seized the Helvetian camp, he found therein a census by names, wherein was recorded the warriors, the old men and women, and children, which is the most ancient statistical record to which reference is made of any portion of the country now embraced within the French empire, and it stands out prominent and solitary from any thing similar with reference to that country for many ages. With the Roman census you are all familiar; its object is plainly indicated in the second chapter of *Luke*, and seems to have led to the fulfilment of prophecy respecting the birth-place of our Saviour. In the remarkable discourse of *Xenophon* upon the manner of increasing the revenues of *Athens*, we find everywhere inculcated the admirable maxim that the true wealth and greatness of a nation consist in the numbers of people well employed. The aim of this remarkable political essay was to demonstrate the feasibility of supporting the population of the state by the development of their native riches, rather than by the oppression of their neighbors by tribute and taxes. It seems a well-authenticated fact that the census of *China* was taken nearly twenty centuries before our era, if any reliance is to be placed in their most venerated writings, which state that it was engraved on their public monuments in order to its preservation, and to prevent any alteration of its text.

The *Arabs*, distinguished as they were in all relating to figures, and who possessed a genius for calculation, were careful cultivators of statistics; and having conquered *Spain* in the eighth century, we learn that they very soon obtained an exact account of the country, its cities, population, and revenues.

While thus it is evident that the nations of the Old World appreciated the value and importance of statistics, it appears from undoubted authority, that on the discovery of this continent people were found who were not ignorant of their utility, but who, with all the disadvantages of an unwritten language, maintained copious statistical records.

The ancient *Peruvians* were found to possess accurate accounts of their number, wealth, and ages, even to those at the breast, and their social condition, by means of threads of differ-

ent colors and strands, peculiarly knotted, "whereby they could express the greatest number at which arithmetic could arrive," the details whereof may be found in the History of Garcilasso de Vega, Book VI., c. 8. The Mexicans, according to Herrera, were found to be but little, if any thing, behind the Peruvians. Under the reign of feudalism and ecclesiastical authority many centuries elapsed during which statistical operations seem to have been entirely suspended, and all traces of their existence in Europe are lost until they were within a recent period reproduced by the more benign institutions of modern days, when we find modern civilized nations imitating the ancients, of which, perhaps, the earliest illustration is afforded by that venerable record yet extant, termed *Doomsday-book*, made in the time of William the Conqueror. This record, the work of eight consecutive years, was conducted somewhat on the plan of the ancient Roman census, except that it was made from the personal visitation of commissioners sent into every county and shire, by whom juries were summoned in each hundred, who obtained from the people, on oath, the name of every manor, of its owner, extent, and the quantity of wood, pasture, and meadow land, the number of ploughs, mill-ponds, and fisheries, its capability of improvement and prospective increase of valuation, with the slaves and live stock. These investigations, however, had for their aim the safety and good of the state, and the primary object was to ascertain, not improve the condition of the people further than to promote harmony by an equalization of their burdens in augmenting the revenues of the State.

In the nature of things such investigations, occur in whatever age they might, could not fail of ends beneficial to the people at large, or exist without being accompanied by the correction of abuses. An early illustration of this occurs in the saying with respect to Cato the Censor, repeated by Plutarch, that he was not less serviceable to the Republic of Rome, by making war against immorality, than Scipio by his victories over her enemies, and the setting up of his statue in the temple of the Goddess of Health, under which was placed an inscription, not of his triumphs in war, but one signifying that it was that of Cato the Censor, who by his good discipline and ordinances reclaimed the Roman commonwealth, when it was declining and falling precipitately into vice.

The scope of national statistical investigations has been gradually enlarging in some countries, while in others, Spain for example, no advance has been made beyond irregularly and

imperfectly numbering the inhabitants ; but it is only of recent date that these inquiries have been systematically prosecuted with the benevolent view of improving the general condition of society, or the amelioration of the misfortunes of those who are morally or physically unable to assist themselves, or of making known their wants.

It is only now, and that to a somewhat limited extent, that the mission of statistics develops itself in carrying out the example of our Saviour while on earth, and by means of those agencies within man's control, conferring the greatest boons upon suffering humanity, which He wrought by miracle. Doubtless the object of the first statistics was to ascertain the amount of destructive or repelling power, after which followed a more general enumeration of the people, succeeded in the progress of discovery by geographical and commercial statistics, followed by those of mining, agriculture, and manufactures; while now its errand embraces the march of the mental faculties and progress of knowledge, combining all the elements of human welfare, charity, benevolence, and religion. The blind are taught to read; the deaf and dumb to express themselves, while sound mental faculties are restored to the insane; a thousand rills of mercy are put in motion, and the heart of man softened by the misery which is brought to light, appealing irresistibly to his humanity, benevolence is forced to flow in rivers of beneficence, whereby man is made happier and better. Of this your own knowledge will suggest innumerable illustrations.

While it is my particular object to address you mainly with reference to national efforts evincing an interest in statistical investigations, with some history of their operation, I cannot entirely pass over some of the individuals who at different times have manifested a high order of talents, and evinced great perseverance and energy in their efforts to ascertain and make known the social condition of the world; for to them is due not only much of the value of history, but the success of the science itself. Were we to attempt even the mention of all who, by their writings and opinions, have declared their consciousness of the importance of such investigations, we would be compelled to omit every thing else, as such a list would comprise a long array of the greatest names which adorn history. When we read their works our sympathies are moved by the appreciation they entertained of the surrounding darkness, and the difficulties they realized of presenting any reliable basis whereon to construct their deductions, while we cannot

but admire the fortitude and genius displayed in their investigations as well as in the results of their calculations. Omitting further allusion to the men of antiquity, since the existence of whom all traces of statistical studies were lost for centuries, as illustrative of the origin of these pursuits in more modern days, and the labor attendant upon these studies in the absence of such reliable data as we now possess, we may refer to one of the numerous works of Sir William Petty, a member of the Royal Society, and founder of the great house of Lansdowne, certainly one of the earliest statistical writers in our language, dated 1686, whereby will be perceived the equally singular data from which he calculated the population of London in his day—thence the population of England, and the estimated population of both in 1840, by which he determined that of the city at about four times what it has attained, and that of the country at only one-fourth its real numbers. (Sir Wm. Petty's *Essays concerning the multiplication of mankind*. London, 1686, pp. 20, 21.) By the examination of such works, we perceive the embarrassment which surrounded the statist of the seventeenth century, and the difficulties at that time experienced by a man of rare genius in determining proximately the first element of political economy, the number of the people, and how, from a few deaths, he arrives at the number of the living, establishes the population of London, whence he deduces that of the kingdom.

In the absence of better data his method was the most rational, and his view of the relative rates of city and country mortality, I imagine, would not be very far from true, if applied at the present day to this city. Adam Smith, in his *Wealth of Nations*, makes frequent mention of the labors of this ingenious political economist, who could educe light from darkness, and to him attributes the first reliable estimate of the Irish population which formed the basis of subsequent estimates for near two centuries, while it was not until 1821 that a reliable census of Ireland was made by order of the government; and that of England itself goes back no further than the present century, and I regret to say that in the variety of its details it has experienced but little improvement, though admitted now to be taken with accuracy.

Perhaps the greatest modern statistical work resulting from individual effort, and combining geographical and statistical knowledge in the most pleasing combination, is the statistical account of Scotland by Sir John Sinclair—a work embracing contributions from nine hundred pens, and filling twenty vol-



umes. This distinguished statist manifested a correct view of the importance of the science he loved so well, no less by his great and imperishable work than the declaration that it was the most important of all sciences, and, in preference to any other, ought to be held in reverence. "No other," he affirms, "can furnish to any mind capable of receiving useful information, so much real entertainment, none can yield such important hints for the improvement of agriculture, for the extension of commercial history, for regulating the conduct of individuals, or promote the general happiness of the species"—a tribute to statistical knowledge, in comprehensiveness and beauty, not a whit behind the oft-quoted tribute to general science by Cicero, in his oration *pro Archia poeta*. Parish registers existed in some of the continental cities, before they were used in England, where, only within little more than a century, have the ages and causes of death been recorded. The first "Bills of Mortality" in England originated at the close of the sixteenth century, to quiet the consternation produced by the frightful ravages of the plague, "which were found so useful as to be continued from the 29th December, 1603, to the present time," while the first life-tables in England were the work of the illustrious Halley.

The labors of the early statistical writers of England, such as Graunt, Petty, Halley, Simpson, and others, throw much light on the subject of population and statistical knowledge in infancy, while those of Price, Smith, Porter, Redgrave, Fonblanque, Neison, Farr, Fletcher, M'Cullough, Brown, and others, have done all for statistical progress, in more modern days, which the human intellect could accomplish in the absence of those national efforts which at the present day characterize the census of the United States, France, and Belgium. They have effected more, with all their disadvantages, than we, who in some respects have better data. Their system of registration, and the facility of insight into their criminal statistics, have afforded many advantages, of which they have made judicious use. The British Government contributes all it feels the power to exercise, for the development of their social condition, while admitting its impotence to concede more. A different government financial policy, which time must inaugurate, will alone effect a change in the reserve of their people into a state of communicative confidence such as we here experience, till when, we may look in vain for much additional light on the social condition of the inhabitants of Great Britain.

In France, of late years, much has been done for statistical



knowledge, but considering how the sciences generally have been cultivated and encouraged by that people, and in view of the fact that Louis XIV. made strenuous efforts for the permanent establishment of statistics in connection with the administration of government, it seems remarkable that so little should have been accomplished until within a very recent period. In 1784, Necker figured the population of France, which he calculated upon the estimated number of births, as Petty had that of England upon the deaths—and no less than three fruitless efforts were made to ascertain the productive capacities of the kingdom. At one time it was attempted to deduce the quantity of agricultural products from the number of ploughs, as was done by Lavoisier. Then, by assuming that the result in 30,000 communes might be predicated upon the facts ascertained respecting a few, as was attempted by Chaptal, or by ascertaining the products of a square league and therefrom deducing the agriculture of the kingdom, as was done by Vauban. In that government statistics have been doomed to trying vicissitudes, arising from the difficulty of their execution, but perhaps more on account of the unpalatable revelations which, in deference to its mission and to truth, it was compelled to make concerning the state of the kingdom. In fact, the fear of popular opposition frequently induced the agents of the French government to resort to artificial calculations to obtain figures which an actual enumeration alone could ensure. In 1822, it was provided by a royal decree, that a general census should be taken every five years; nevertheless, we learn that in place of the actual enumeration, which should have been made in 1827, the number of inhabitants was declared by simply adding to the population of 1822 the excess of births over deaths for the intermediate time, and the result was determined by royal ordinance to be authentic.

French writers claim that a census of France was made in the sixteenth century, under Charles IX., of which they profess to give the results (although no traces of the original are to be found) at 20,000,000 of population, whereas, by that published in 1720, their numbers only amounted to 19,500,000. It is not impossible that both statements are near the truth, in which case we learn the depopulating effects of war and oppressive edicts. Among the distinguished men of the past century, who adorned statistics by their writings, may be mentioned M. Buffon the celebrated naturalist, and Pascal the philosopher and Christian—both ornaments to science and to France.

In 1833, statistics in France were established, we hope,

on a firm foundation, since which they have received the fostering care of government and the immediate attention of some of the first scientific men of the empire, to whose discretion their execution has been entrusted—and for the last fifteen years volume after volume has appeared, manifesting, on the part of that government, a determination to take the lead in every branch of statistical investigation calculated to illustrate the moral, social, and material progress of their people.

To the labors of the polite and indefatigable Moreau de Jonnes, long the chief of the French bureau of statistics, have I been indebted for many of the statistical facts presented in this paper, in connection with the mention of whom I may state that he expressed to me personally, a few years since, his high appreciation of our system of enumeration, declaring at the same time that our schedules for obtaining the primary facts are the most perfect and comprehensive ever used.

In Russia, that wise monarch, Peter the Great, established, in 1722, the registration of births, marriages, and deaths, and in the year succeeding, caused the first enumeration of all the people to be made, prescribing its renewal every twenty years; measures which have since been conducted with regularity and care, so that the Russian government possess what no other government can boast, the statistics of the movement of her population for a period embracing considerably more than an entire century. The long period through which the Russian government has ever successfully pursued this great work, is a triumphant vindication of its utility, and a sufficient answer to the allegations continually made by uninformed persons, that but little or no reliance can be placed on the revelations of a national census; and when we look upon the 60,000,000 of people to be enumerated, and the immense extent and character of the country to be included, we may well admire the enterprise, perseverance, and capacity of those intrusted with so responsible an undertaking.

Sweden, too, for more than a hundred years, has prosecuted statistical investigations, and on recommendations originating with the Academy of Sciences at Stockholm, which counted the celebrated Linnæus among its members, established a system of enumerations and registrations which have been conducted with care, minuteness, and perfection worthy their academic origin. To Sweden is the world indebted for the invention of mortality-tables and the illustration of their uses.

In Prussia, statistical science which owes its establishment to the penetration of Frederick the Great, has long received

the fostering care of government, but it was not until 1806, under the reign of Frederick William III., that a bureau of statistics was established at Berlin. After near half a century of independent, successful prosecution of statistical investigations, including a triennial census enumerating the population, domestic animals, mines, and manufacturing establishments subject to taxation, and the registration of births, marriages, and deaths, this government formed a union of the thirty-nine principal German States into a single commercial association termed the Zollverein, whereof there are conducted special and detailed statistical labors, which, until his death, were under the direction of Dieterici. In referring to this union, Moreau de Jonnes remarks, that "this is the first time that, in Europe, different countries leagued themselves under the banner of science, to produce a work on social economy, expressed by numerical terms, and in which each participated with a fraternal spirit."

For about thirty years the statistics of Belgium have been prosecuted, irregularly enumerating the inhabitants, to the year 1846, when, as an independent State, their first census was taken.

In the report of this work, drawn up by Quetelet, and presented by the Minister of the Interior to the King, we perceive the exhibition of wonderful hesitation and care in the commencement and execution of this their first effort on an extended scale, to obtain the general statistics of the kingdom, a duty which was intrusted to a Board of fifteen persons, embracing some of the most distinguished savans of Belgium, including Quetelet, Detournay, Ductipaux, General Trumper, Visseers, and Heuschling.

The census of Belgium, to which I allude, embraces at once population, agriculture, and industry, with many details of great interest, while those previously taken extended to population alone. The formation of agricultural and manufacturing statistics presents Belgium in a new aspect. For the first time the situation of the productive wealth of the country, in its totality and details, is authenticated; it is also the first time that statistical science has there been called on to proceed to so extended and complicated an undertaking, which it has successfully accomplished. It would appear that the statistical Board, before venturing upon their great enterprise of the national census upon an enlarged system, made an experiment as to the population of the city of Brussels. The history of this work is narrated by Baron Quetelet with

great clearness. In fact, it was my intention to have read a portion of this complete, yet simple, history of the experience of the agents of a cautious, prudent, and enlightened government in one of its measures of the greatest public utility, which I thought would not prove void of interest to an association like this, as it inaugurated a new era in the history of their statistical progress, and in the pursuit of which we may discover, as its results compared with our own, the influence of different institutions upon people of very kindred pursuits, of similar mental progress, but geographically wide apart—but time will not permit. The prosecution of such a work, only second in detail to that of our own country, illustrates an advance in Europe which the world might not have witnessed for a century, but for the success which has so long attended the prosecution of our own. The Report is occupied in detailing the groundwork and results, whereby it forcibly illustrates the value of their labors in the correction which they effect of many false or erroneous ideas previously entertained, on many questions relating to the condition of the kingdom.

It is about a century since, that the Emperor of Austria, Francis I., decreed the census of his kingdom, but it is only within the present century that regular statistical operations are conducted to the extent of numbering the people. Among modern statistical writers on the continent, in addition to those already mentioned, appear the names of D'Alembert, Euler, Lagrange, Laplace, and Condorcet, "all throwing a charm over a science with which their names have been associated."

Lastly, in noticing the coteremporaneous progress of statistics, we come to consider what have been done in our own country. A French statistical writer, in speaking of our country, utters the following compliment: "The United States," he remarks, "present in their history a phenomenon which has no other example. It is that of a people which begins the statistics of its country on the day on which it lays the foundation of its social condition, and which regulates, in the same act, the enumeration of its fellow-citizens, their civil and political rights, and the future destinies of the country." In another place, referring to the penalties imposed for a refusal to answer the interrogatories of the Marshal in his lawful duty, he says, "Statistics were treated seriously eighty years ago by a people that, however jealous it is of its liberty, does not hesitate to punish, as a culpable infraction, what is elsewhere regarded as an action of no consequence, or treated

with futile opposition. In the United States," he continues, "it is a civil duty, the importance of which seemed so great to the convention over which Washington presided, and which numbered among its members a Madison, a Livingston, and a Franklin, that it imposed fines upon a citizen or a magistrate who disregarded it."

I could present no better introduction to a short historical account of our national censuses, the first of which was taken in 1790, in accordance with the second section of the first article of our Constitution, which requires an enumeration of the inhabitants within each subsequent decade, in pursuance of which, we have made seven enumerations of our people, and have commenced preparatory measures for taking the eighth. The provision of the constitution requires nothing more than a mere numbering of the inhabitants, made necessary for an equal representation in Congress, and the apportionment of taxes (should it become necessary for the support of the government) among the several States in proportion to the population of each.

Dr. Davenant, a powerful writer of the seventeenth century, commences his volume of discourses on the public revenues and trade, printed in 1698, with the declaration, that "He who advances a new matter, is bound to show the foundation he builds upon, whereby the public may better judge whether he be right or wrong in his superstructure," upon which principle I will, without troubling you with an account in detail of the plans adopted for the several intermediate enumerations which varied with each census, endeavor to present a short account of the method adopted in taking the seventh, which is rendered more important from the fact that, in accepting the plan for this work, Congress, by statute, made it the basis for subsequent enumerations, unless a law changing its nature should be passed previous to the first day of January of any year wherein the enumeration under the Constitution was to be made; a contingency not at all likely to occur so as to prevent the taking of two national censuses on the same plan, if we may judge from the weak support accorded in the last Congress to propositions introduced for the purpose of effecting some modification of the law, and the short period which now intervenes previous to that indicated in the statute when the time for amendment will have passed. The wisdom of this provision will readily be conceded by all who have observed the uncertainty attending legislation with reference to our national census, especially the doubt which seemed to attend for a long time the enactment of the necessary law for prosecuting the

seventh enumeration, which was passed on the last day of the session. It was the danger which ever seemed to exist when this subject was agitated in Congress, of a failure to make provision for its timely execution, that induced Mr. Vinton, of Ohio, to insert the amendment which, being adopted, forever precludes the failure of the decennial census, unless the law should be repealed. To the sagacity of the same gentleman is the country indebted for another very important and tranquilizing amendment to the bill, namely, that of establishing the ratio of Representation in the House of Representatives, upon a just principle, in advance of a knowledge of any local effect it might have, and thus taking out of that body one of the most dangerous and exciting topics of legislation. By this latter amendment the whole number of representatives is fixed at two hundred and thirty-three, who are apportioned among the States respectively by the Secretary of the Interior, by dividing the number of the free population of the States, to which, in slave-holding States, three-fifths of the slaves is added, by the number two hundred and thirty-three, and the product of such division (rejecting all fractions of a unit) shall be the ratio of representation of the several States ; but as the number and amount of the fractions among so many dividends would, of course, in the aggregate, be sufficient to reduce the number of Representatives below the number specified, it was provided that the whole number should be supplied by assigning to so many States having the largest fractions, an additional member each for its fraction, until the number of two hundred and thirty-three members should be assigned to the several States. It is also provided that new States being admitted subsequent to any one of the decennial enumerations, shall have representatives on the same basis, while it is at the same time provided, that such excess in the number of members of the House of Representatives shall only continue until the next apportionment of Representatives under the next succeeding census. The number of Representatives being fixed by law at two hundred and thirty-three, it may be asked how it happened that, under the last apportionment, the number of Representatives was two hundred and thirty-four? to which I reply, that a portion of the returns of California having been destroyed by fire at San Francisco, enough only reaching the Department to entitle that State to one member, while it was evident she possessed population enough for two, and the Representatives from South Carolina, contending against being deprived of the claim she rightfully possessed for the eleventh member admit-



ted by virtue of the fractions ; the matter was compromised by a law of July 30, 1852, whereby to California was conceded two members, (with which number she had been admitted into the Union,) and the number of Representatives was at the same time extended to two hundred and thirty-four, until a new apportionment should be made under the eighth census ; and in the same law provision was made against future like contingencies. The practical execution of the apportionment was as follows : The total free population of the States amounting to 19,846,710, and the slave population to 3,200,380, whereof three-fifths being added to the former made a representative population of 21,766,938 ; this being divided by 233 the product became 93,420, and the representative population of each State being divided by the latter sum, the quotient expressed the number of Representatives. This process having been completed, whereby two hundred and twenty-two members were apportioned ; in order to make the complement eleven members were to be added, one to each of the eleven States whose population presented the largest fractions. Thus was settled, at least for a time, what has been viewed as one of the most dangerous and exciting topics connected with our national Administration, to the disappointment, I am inclined to think, of some who were not without the hope of Congress being unable always to meet this constitutional requirement, whereby confusion and disastrous consequences might have followed. Thanks to a superintending Providence, and for our consolation, there seem ever to be found in all emergencies, men whose calmness, judgment, and discretion, may be relied on to ward off impending evils and rescue our ark from danger.

In the preliminary arrangements for the seventh census, unusual provision was made for securing the best plan upon which to conduct its operations ; and although some of the details adopted by the Census Board and presented to Congress, met, as might have been expected, strenuous opposition from a few members in both houses and of some persons without, the hostility was not as great as was anticipated, and the recommendations of the Board were adopted by a large majority with no other than slight verbal alterations. As "prosperity only crowns the efforts of industry when its operations involve a judicious division of labor," so the successful investigations of statistical science depend not only upon specializing each branch of its inquiry, but, following up every ramification to its elementary beginnings, from which follows the impossibility of compiling an accurate or reliable statisti-



cal account of any people without first obtaining the history and condition of families and individuals, a fact which although lost sight of in practice, through intermediate centuries, was as well understood when the children of Israel were numbered in the wilderness of Sinai, and the Roman people responded to the questions of the census, as now. This consideration, long lost sight of, though supported by such historic examples, induced the Census Board to prepare a series of tables of great simplicity and scope, the records whereof embody, for the time, the history of our entire population, comprising one great family record which will be appealed to for generations to come, as they now are, for details which can be found nowhere else.

The first table relates exclusively to the free population, and was prepared with a view to obtaining, in the simplest form, the greatest number of facts essential to an understanding of the numbers and condition of the American people in all their relations, together with the number of habitations. By this schedule we have the number of families—the age, sex, and color, distinguishing between the white, black, and mixed, in order, if possible, to obtain data whereby we might form some judgment respecting the admixture of races upon their physical condition; the nativity of each inhabitant is returned, with the number of those married within the year; those attending school, with the adults unable to read and write, the deaf and dumb, blind, insane, and idiotic, paupers, criminals, and convicts—and all the facts legitimately applying to the history of each and every individual are given together, so as to present a most interesting combination of facts, which exhibit the relation of age, knowledge, crime, physical or mental infirmity to all of every sex, color, condition, and origin, which will be taken with more and greater accuracy, as each effort shall furnish the means to remedy the causes which have led to imperfect returns. Many of these details are rendered the more necessary in our country because of the want of State laws for the registration of deaths, births, and marriages; and although the advantages arising from the decennial enumeration of these facts may seem comparatively limited, they furnish in the absence of data more general in their application, a great deal from which we may be enabled to form opinions, and institute comparisons; eventually, perhaps, from their decided utility, inducing the several States to enact and enforce laws for the registration of the

three great epochs in man's history, of the importance of which several have already manifested their appreciation.

The second schedule gives the numbers and ages of all the slaves with their sex and color, together with the number who have escaped from bondage—the number manumitted, with the deaf and dumb, the blind, insane, and idiotic. It was not deemed necessary to incumber this schedule with many of the features of the first, because the profession, occupation, or trade of a slave, was a matter optional with his master, and varied with circumstances; he could not own real estate; his birthplace could not generally be recorded with certainty; their marriages were a matter of doubt at the best; Congress, doubtless, acted wisely in declining to institute investigations, which would be looked upon as a stretch of authority, lead to no practical good, make the census unpopular, and defeat the obtainment of many of the interesting and important details which we are now able to acquire.

The third schedule relates to the statistics of mortality, by which it was endeavored to obtain for the first time a reliable account of the number of persons who died within the year previous to the first day of June, the day with respect to which the enumeration was made. The facts ascertained, are the name, age, sex, color, civil condition, marital relation, nativity, occupation, disease, and duration of illness, of all persons dying within the previous twelve months, in each State and Territory. In determining to procure these statistics, much opposition was experienced in and out of Congress, from persons who pretended to foretell that such information could not be obtained with any approach to accuracy by means of the census.

These predictions were not verified by the results. For the country in general, they are believed to be quite accurate, for a first effort, while for cities, where great fluctuation of population occurs annually, and where an important event may occur in a family and sooner be lost sight of in the excitement of places where a dense population exists than in the quiet of country and village life, the returns are admitted to be often materially defective; but fortunately, as a general rule, where the results we aim at are most difficult of acquirement by means of the census, there exist other means of obtaining them, of which we fail not to avail ourselves. Admitting the returns to have been imperfect, they are not without great and important uses, for it does not follow that imperfections destroy the value of statistics, unless they are the result of design or are of a na-

ture to present exaggerated results and lead to false deductions. In a letter of Quetelet to the Grand Duke of Saxe-Coburg and Gotha, in answer to the question, "Can any advantage be derived from incomplete statistical documents?" that distinguished philosopher remarks as follows: "The number of the population is, without doubt, the most important statistical element. However, I do not think there exists a single country in the world in which this element is well known, and in this I speak not of mathematical precision. In this state of things, should we reject all the results into which the number of population enters although evidently faulty? I think not, especially when we would consider relative quantities rather than absolute." No opinion of mine could add weight to such authority—hence, from these numbers we arrive at the proportion of diseases of a particular character and diverse natures which occur in various situations, and obtain a combination of facts illustrating the influence of climate upon all manner and descriptions of people who live and die within our borders; and continuously pursuing and improving the mode of execution, it will not be long before their effect will be better understood and studied by the emigrant, in determining his future home, and the citizen in choosing his place of residence. Exhibiting the effect of occupation and trade, they will not be without their influence in deciding the choice of a profession, while dwellers in cities and large towns will learn the necessity of better sanitary regulations and the advantage of a purer atmosphere at home, or the necessity of a country residence for their own benefit and the security of their offspring.

Were it part of my object, this evening, to occupy your attention with an account in detail, of the ascertained results of statistical investigations, and the benefits which are known to have followed, rather than their history, it would not be difficult to make manifest their value as illustrated by developments in Europe and America, declarative of the extraordinary fatal contingencies associated with life in densely populated and illy ventilated towns, and the average prolongation of days promoted by remedial appliances for improving their sanitary condition. It would appear from well-established facts, that every ray of sunlight, and each additional breeze admitted from a pure and healthy atmosphere, mingled with electric rapidity with the blood of all the people, and with healing on their wings brought life, animation, and courage. Fortunately, perhaps, for our sympathies, these causes which are preventable, and effects which are hidden because slow, wide-spread, and

gradual, are not apparent at any one period, or disclosed in any one portion of the year, unless perchance developed by pestilence. Were the preventable deaths which annually occur in this city of New York, to take place in any one week, they would throw a pall over every street and lane, and strike such a terror into the minds of the people as to paralyze industry and stagnate trade. Now, apart from the consideration involved in the great amount of preventable *sickness*, (not unto death,) whereby such a vast amount of labor and earnings are lost and misery inflicted, were the amount of preventable annual mortality for two consecutive years, to be concentrated into the same month for each year, you would feel no hesitation in proceeding at once, airy and well ventilated as your city may seem, to demolish squares of buildings to give place to public grounds, while beautiful parks would appear as if by magic, throughout the length and breadth of this great metropolis; and while you would effect this with a hearty good will, regardless of the cost, it would be found a wise and economical expenditure of treasure. The fall of population, like the dropping of the leaf of the evergreen, is not realized because of so silent, slow, and gradual occurrence, and we look upon what is left and what comes on to take the place of the departed, quite unthoughtful of the silent, deadly, and inevitable influences at work. To these causes and effects, statistics open the eye of reason, alas! too often impotent to provide a remedy, or indifferent to its exercise. Our first efforts to obtain the statistics of mortality have not been without their fruits even at a very distant point from where they were collected together, and that even long before their publication by government. In this I refer to the revelations made by Dr. E. H. Barton of New Orleans, the author of two valuable contributions to medical and statistical science—one a report of the preventable diseases of Louisiana, Mississippi, Arkansas, and Texas, accompanied by maps, and the other a large volume on cholera. The first work forcibly illustrates the value of our mortuary statistics, and the preparation of such a volume, by Dr. Barton, is refutation sufficient of any charge of the uselessness or unreliability of these statistics. In pursuance of a wish expressed by that estimable man, he was furnished, in 1851, with such developments respecting the mortuary returns of these States as the revelations of the census admitted, and I received from him in April, 1852, a letter communicating an account of the uses to which he had applied them, which I will read—before doing which it may not be out of place to

state that his opinion of the value of these statistics, as we ascertained them, was fully endorsed by some of the most eminent medical men of the country :

NEW ORLEANS, *April 27, 1852.*

MY DEAR SIR : I have just finished the task, the materials for which were so kindly furnished me by you, for which be pleased again to accept my sincere acknowledgments.

I am of opinion the great work you are now laboring to accomplish is second to none in importance, undertaken by our, or indeed any other country, and will be more appreciated just as it is understood.

Out of the medical returns, I have constructed a Sanitary Map for each of the States of Louisiana, Mississippi, Arkansas, and Texas, to accompany and illustrate my report to the American Medical Association, meeting in Richmond, the first Monday in May. I beg you to accept a copy of each of these maps, in consideration of the favor you have done me. The only explanation required, probably is, that as it was impossible to express on one series of maps, the diversified sanitary condition arising from the greater or less prevalence of every form of morbid action, I have selected that class which embraces the mass of those maladies which constitute the distinction between healthy and sickly communities, so as to compare one country, State, or county with another, and which are more or less under the control of police regulations and sanitary laws ; the Zymotic, (including fevers, cholera, intestinal diseases, &c.)

I have arranged them, as per marginal explanation, according to the number per thousand of the population which have suffered from them.

You see Louisiana has there a distinguished showing ; this was owing to the great prevalence of cholera, (25 per cent. of the entire mortality having been caused by that disease.) You see how it followed the water courses, and the great routes of human intercourse, and how free the seacoast and pine woods were from it.

I wish the whole country was thus delineated ; your labors would be then appreciated, and we should be enabled the more easily to compare by the next census—showing, with this, how our countrymen may have been benefited by the lesson ; for, as I said above, these diseases arise in the main from *preventable conditions*, such as an advanced civilization should

correct ; and, to use the language of Dr. Rush, such as should be enforced by a *penalty* !

I have added some tables comparing the rural districts of my four States with the rural districts of Cuba, and the cities of Havana, Mexico, &c., from details I collected while travelling in those countries when in the army. They are curious, and highly in our favor.

I have also added all the meteorological details I could procure of the States assigned to me, and particularly of my State, and have added the *average solar radiation* for each month in the year. I remain, with high regard,

Very respectfully, your obedient servant,

To J. C. G. K.

E. H. BARTON.

I received from this useful and benevolent man, in the month of September last, a communication wherein he expresses his approbation of the recommendation of the Secretary of the Interior in his last Annual Report, that the eighth census shall be taken in conformity with the law prescribing the plan of the seventh and subsequent enumerations, and dwelling at some length on the wisdom and propriety of the Secretary's reasons for desiring to conduct the coming enumeration upon the manner of the previous one ; and expressing in strong and confiding terms the pleasure with which he anticipates the mortuary returns for the materials they will furnish, whereby he can prosecute his favorite investigations, and by throwing additional light upon the causes of mortality, promote that of humanity, little dreaming, alas ! that before the letter reached me he would be inscribed among the five hundred thousand, whose names will form the melancholy record of the dead comprising the mortuary catalogue of the eighth census.

The fourth schedule relates to agriculture, giving the number of farmers and planters, the quantity of improved and unimproved land, the value of farming implements and machinery, the number and description of live stock, the value of animals slaughtered ; and enumerating thirty varieties of agricultural productions which enter into consumption and contribute to the commerce and manufactures of the world. "Were we to attempt in this country," said Joseph Hume on one occasion, as he was attentively scrutinizing some of the returns in the form they came from the hands of the marshal, when he came to inspect the agricultural schedule, "were we to attempt in this country, officially to obtain what your



people have so cheerfully and universally communicated in accordance with a law of Congress, it would effect a revolution in less than six weeks." This distinguished man attributed the difference to the general diffusion of intelligence among our inhabitants, the sympathy and reciprocal obligations and confidence existing between the representatives and their constituents, and the different motives which naturally would be attributed to the two governments respectively, by the people. In connection with this incident, I will mention what I look upon as a remarkable and significant fact developed in the taking of the seventh census, wherein every man was approached with a pretty formidable array of questions, which is, that in our entire country, three persons only were found to prove contumacious in refusing to answer, and that only one persisted to the extent of requiring a notification from the District Attorney of the United States, when his scruples vanished and he communicated the information demanded. I look upon this fact as important in every aspect, whether viewed as illustrative of the spirit of obedience in the people, or as indicative of the general truth of the census; for if the inhabitants generally respond to the plain questions proposed—and we have no reason to believe they responded falsely—there can be no ground for affirming that the census is not essentially reliable, if any census ever was, or any ever will be so, for there can be no more certain way of ascertaining the truth with respect to numbers than by combining the elementary details as they are given in by individuals, and in all such returns, the errors incident to human infirmity will balance each other. This truth is susceptible of proof, even in cases of conjecture where there are no data but what may seem imperfect. A judicious observer, while he might not be able to state the precise age of any gentleman here present, and therefore be without any ascertained fact upon which to predicate his conclusion, will nevertheless be able to fix with proximate accuracy, the aggregate age of this audience; and so you may take a target of the most irregular form, wherein at some point to you unknown, twenty shots had been fired, and by a little calculation determine the precise spot aimed at. How much more therefore are we justified in determining the truth of statistics based upon actual returns.

The fifth schedule relates to the manufactures of the country, is arranged on a plan of great simplicity, and constructed on entirely different principles from any ever used previously for a like purpose—consisting of fourteen columns



or headings, applicable to the details of every branch of productive industry, with the number of male and female operatives, their wages, and the quantity, kind, and value of raw materials, value of fuel, the motive power, and the quantity, kind, and value of each article produced. The figures with respect to each establishment are recorded separately, so that, as is the case with the other schedules, the marshals are not required to add any two numbers together; their whole duty in this entire work being to ascertain the primitive numbers with accuracy and care, leaving every calculation to be made in the office at Washington.

The results of this portion of the census were omitted in the earlier publications of the seventh census, and were only communicated to Congress within the present year in accordance with an appropriation of the last Congress, and made public since the adjournment. As no copies of this work were printed for distribution, it may not be out of place to say something with regard to it.

Although it pleased Congress in ordering the publication of this work, to leave out much with respect to details, which, in my opinion, should have been included, nevertheless, we establish by what has appeared, some of the most important facts with respect to a people who have attained to numbers, wealth, power, and influence, with a rapidity unparalleled, at a moment when many nations of the old world appear to be rising from a lethargy wherein they seemed to rest until we should attain to the dignity of rivals, and when a spirit of emulation, such as never before prevailed, exists among all countries to render themselves independent each of the other. We exhibit the fact of a nation, the birth of which those living can remember, whereof the mechanical industry of less than one-twentieth of her people, by doubling the value of their raw materials, produced manufactured articles to the value of more than one thousand millions of dollars, giving support to one-fifth of the entire population, and promoting the commerce of the world and the manufactures of other nations by the raw materials we send abroad. It is further made to appear in what mechanical interests the capital of our people is invested, and to what industrial pursuits their energies are directed, teaching the value of those resources which enlarge our own immunity, as well as those that augment the dependence of others upon us.

In a few instances, in the details of this work, it will appear that the value of raw materials exceeds the product

and the amount paid for labor. In such it must be concluded that when the census was taken, these manufactories had not been in operation a sufficient time to consume the raw materials, or that their operations were for a time suspended on account of temperature, the failure of motive power, as with machinery impelled by water, or the transient character of their objects, such as fisheries, &c. This difficulty has arisen in part by returning the monthly cost of labor, which, in the absence of specific information, was multiplied by twelve to arrive at the annual expenditure. These are exceptions which in nowise tend to impair the truth of the returns at large, or in any way misrepresent the capital and productions, the value of labor during the time of operation, or the worth of the product, and cannot in the least affect the general credibility of the work; and I have deemed them worthy of mention, lest persons unfamiliar with such contingencies might be led to form conclusions unwarranted by the facts. They are exceptions which we hope to avoid hereafter, although when understood aright, they serve rather to confirm than weaken the general reliability of the tables. In the compilation of the abstract of manufactures, I did not deem it proper to enter into any deduction of their consequences, or to record any expression of opinion as to their tendency. While there may be those to whom this reserve may appear to diminish the interest and value of the work, it was in my opinion the better course; and in view of the fact that the mere expression of immutable truths often provokes the hostility of those to whom they are unpalatable, and the difficulty of engaging in interpretation without appearing to some to have made indiscreet commentaries, or imparted a false coloring to facts, I was induced to act strictly within the spirit of the act of Congress, and, without the incorporation of any notes, "record the numbers distinct from any deduction or inference respecting their teachings, to stand in their simple integrity enduring and independent exponents of the truth." With respect to the aggregate amount and value of the several manufactures, it should be borne in mind that no interests were included, whereof the productions did not amount to the value of \$500 per annum, so that our aggregates may safely be determined to be within, rather than beyond the truth by several millions of dollars. It was necessary to establish some limit, and a proper one, it is believed, was observed. The proportion of manufactures of a less sum annually than that stated, varies in different sections of the country, and cannot with our present information be

satisfactorily estimated; comparatively small in cities and densely populated regions of the country, the proportion would be found not at all inconsiderable in villages and country places where living is cheap. It must not be concluded however, that the results of labor devoted to these minor interests is entirely unrepresented, as they often form some of the elements of the larger operations included in the digest.

Our sixth and last schedule relates to ten different subjects, being constructed on the same general principle with the others so as to embrace all the facts ascertainable respecting the value of property, amount of taxes, state of education, literature, religion, pauperism, crime, and wages.

While prepared to vindicate the general correctness of the seventh census, to assume that errors may not exist in details involving interests of such magnitude and variety, would be more than any one familiar with the difficulties attendant upon such investigations would venture, while a critical examination will inspire confidence in the general accuracy of the work, and prove that any serious imperfections which may be charged are more often imaginary than real, and more frequently alleged by persons of limited means of information than by statisticians of judgment and experience. Some claim for indulgence at least, on the part of those intrusted with the execution of the work, might, with reason, be urged on the ground of but eight days intervening between the passage of this law to take the census, and the time of its commencement, in which the instructions to the marshals were to be matured and the entire machinery of a great and important work put in motion on a new and untried principle; and with respect to the statistics of manufactures, the further fact that a period of about five years intervened from the time the superintendent ceased to be connected with the suspended work to that when he was honored with the appointment to complete it. I have thus given, in too many words, but in as few as my poor abilities would admit, an imperfect account of the schedules used in taking the seventh census, from which you will be enabled to form some idea of the variety and combination of facts they are adapted to illustrate.

As the numerous letters daily received at the census office asking information with respect to the manner of conducting the *operations of the census*, make it apparent that the details are not generally understood, I have thought a moment might be advantageously appropriated to this subject.

The General Government has in each State and Territory,

one or more judicial districts, with each of which is connected a marshal, who acts as the high sheriff in the District Court of the United States. These marshals are required by law to subdivide their districts, and for each subdivision to appoint an assistant—taking care not to include a greater population (by estimate) than 20,000 in any one subdivision.

The assistants having qualified, by oath, for the proper performance of their duties, are furnished through the marshals with blanks and instructions. In the prosecution of their work they are required to visit every house, manufactory and workshop, and when they have completed their district, are required to make two copies of their work. The original returns are filed with the clerk of the court of each county, and the copies are forwarded to the marshal, who transmits one copy to the secretary of the State for his district, and the other to the census office in Washington.

The compensation to the marshal is in proportion to the population enumerated by his assistants; should that exceed one million, he is paid one dollar for each thousand persons enumerated; should the population returned by his assistants be less than one million, he receives the sum of one dollar and twenty-five cents for each 1,000 persons returned;—a system of compensation sufficiently moderate, but which may admit of the payment of a greater amount for a lesser service, as in the case of a marshal whose returns include 950,000 at \$1 25 per thousand, receives more than he whose returns do not much exceed a million, an inequality not unusual in rating fees for mileage and other services. Should the population of a district be less than 400,000, the marshal is allowed additional compensation for clerk hire.

The assistants who perform the work of enumeration are paid on a different principle, combining in a novel manner compensation for labor and travel, one which was found to operate very fairly and satisfactorily to the employees and Government. Their allowance is two cents for each person enumerated; for each farm, ten cents; for each establishment of productive industry, fifteen cents; for social statistics, two per centum on the amount allowed for enumerating the population, and two cents for each mortality return, with ten cents per mile for travelling expenses, to be ascertained by multiplying the square root of the number of dwelling houses in his district by the square root of the number of square miles in his division; the product whereof is to be deemed the number of miles travelled, and eight cents per page for the two copies.

The marshals and assistants in California, Oregon, Utah, and New Mexico, under the operation of an amendment to the law, received compensation at the discretion of the Secretary of the Interior, which was determined by the addition of one hundred per cent. to that provided by law. Such, gentlemen, is the plan and such the details of executing the census of the United States as now provided by statute, and I hope you will agree with me in according your meed of approbation to the practical and enlightened views of the Secretary of the Interior in his last Annual Report, wherein he expresses, in statesman-like language, the importance of this great work, and the unspeakable gain to two or more enumerations reciprocally when so conducted as to facilitate comparisons between them—a course altogether in consonance with his liberal and patriotic views on other great national subjects

Having limited my paper to the subject of national statistics, I have necessarily omitted all mention of the many interesting facts illustrative of the indebtedness of mankind to the efforts of different societies, and many individuals, who have thrown great light on statistical science and done much to elevate the pursuit.

The records of the different churches in Europe have furnished some of the most important data for a long period of years, while some of this country have contributed valuable information, and many associations in Europe and America have established data of great importance. The history of these movements would furnish an interesting theme, while the moral and political effect of national statistical efforts would prove no less entertaining, and either would present points of much more general interest than the dry one which I have so imperfectly dwelt upon.

I have thus feebly attempted to present an outline of the progress of statistics, and you will not fail to have observed how in different ages, those efforts, the results whereof form the most important historical facts of the time, have originated with associations of individuals or societies like yours, and to such influences may clearly be traced the greatest public measures for improving the moral state and social happiness of man.

VII.—*Benevolent Societies among the Laboring Classes.* By  
JAMES WYNNE, M. D.

Read March 12, 1857.

By the inevitable decree of a divine Power, man is made to earn his daily bread by the sweat of his brow ; and, for the few who are placed above the necessity of unceasing toil, vast numbers are compelled to labor for a bare subsistence. Nor does there appear to exist any reason to complain at this arrangement of human society so far as the happiness of the mass of mankind is concerned, for that same power which has doomed the human race to toil has, likewise, infused a mixture of sorrow and joy into the lot of each individual, and it not unfrequently happens that the possessor of wealth or power, with its vast accumulated responsibilities, has more real suffering than he who carelessly wends his way to his daily recurring toil.

While in health, labor is the most potent assuager of the ills of humanity ; and he is as great a benefactor who provides the honest poor with the means of labor at remunerative wages, as he who erects hospitals for their sustenance when deprived of the means of taking care of themselves.

But experience teaches that disease is constantly alternating with health, and, while it deprives the individual of the physical power to earn his own livelihood, places him under the necessity of supplying new and imperious wants. The more provident of those whose daily labor yields a bare maintenance usually make provision for this condition in advance, by appropriating a part of their weekly earnings to this purpose, under the patronage of those benevolent societies which are scattered broadcast over the land. I propose to invite your attention to such facts connected with these relief societies as benevolent individuals, or societies constituted like the one which I have the honor to address, have collected and arranged, and although my subject may not furnish the same field for elegant arrangement of thought or beauty of diction as some others, yet it yields to none in practical importance.

Is it not something to ascertain the chances of life and health, under diverse circumstances and varied employments ? Is it not of the greatest importance to procure reliable information upon which the hard earnings thus taken from daily labor to provide for inevitable but uncertain disease, shall be so husbanded as not to disappoint those, who, with no hope of

future means, abstract from a small weekly allowance a sum sacred to this object. The proper disposition of this involves one of the most sacred of trusts whose influence extends far beyond the immediate recipients, and constitutes a strong bond for the good behavior and faithful citizenship of that large and worthy class who are engaged in mechanical pursuits. So long as they have confidence in beneficial sick societies, so long will they continue as a whole to appropriate a part of their earnings to their own maintenance and that of their families when disabled by accident or disease; but let this confidence be lost, and sickness will find them a charge upon the public purse, and health, careless and improvident members of society, if nothing worse.

Here is an important reason for ascertaining the foundation upon which provident societies rest; and it happens that the principles which lie at their base involve such accuracy of statistics, and such intricate mathematical calculations, as to place them beyond the reach of those more immediately concerned, and to impose the task of their elucidation upon learned men, either singly, or formed into such societies as the American Geographical and Statistical Society.

Life assurance, and government annuity offices, where the more opulent usually make provision for the future, have within the last half century done much to develop this subject so far as their own operations are concerned; but even here there is much, especially in this country, where the movements of population are not as well defined as in Europe, to be learned. I speak advisedly upon this subject, because it was my good fortune to be appointed, by a society whose usefulness is as extensive as its vast resources, a commission to investigate and report upon this very subject, to which report I would refer for some very curious, and, it is to be hoped, reliable information in relation to the laws of disease and mortality.\*

It may surprise those members who have not had their attention particularly directed to vital statistics, to learn, that until within the last fifteen years there were absolutely no statistics in a reliable form upon which to base an inquiry into the principles regulating the movements and probable results of beneficial societies among the laboring classes in any country. It is true that Mr. Ansell had collected and published in 1835, under the superintendence of the Society for the

\* Report on Vital Statistics of the United States, made to the Mutual Life Insurance Company of New York, pp. 214 4to. Baillière, New York and London.



Diffusion of Useful Knowledge, some valuable statistics gleaned from Scotch societies ; but it remained for Mr. Neison, the eminent Actuary of the Medical Invalid and General Life Office of London, in the discharge of the duties of his office, to collect and arrange the first comprehensive series of tables upon this subject, which were read before the Statistical Society of London, in March, 1845, and published in the valuable journal of the Society in that and the following year.

I particularly allude to these papers, because, prior to their appearance, it was supposed that the chances of life were altogether in favor of the privileged classes, and that length of days was far from being a concomitant with the laborious toil and exposure of the hardy artizan ; but these tables demonstrate that the chances of life are better among the latter than among any other class of which the healthiest life table gives an account.

This is a gratifying fact, and one which demonstrates how admirably in the physical, as well as the moral world, Providence has shaped its ends, so as to measure out to each his due allowance of advantages and disadvantages.

The members of benevolent societies in every country almost exclusively belong to those who are subjected to severe toil, conjoined either to an excess of temperature, vitiated air, and constrained positions, or to the inclemencies of the seasons. Their dwellings are usually of an inferior order, and in the most unwholesome parts of town, all of which would appear to indicate a less duration or probability of life than among those habituated to the comforts and luxuries which environ the upper classes of society, and bestow the appearance at least of superior enjoyment and immunity from disease. But, on the other hand, it must be remembered that the payment of the small weekly stipend necessary to constitute membership, presupposes a certain degree of thrift, which places the members above the reckless and improvident, who are exposed by imprudence or want of frugality, to the vicissitudes of poverty and disease.

The Massachusetts registration returns, which record the average age at death of a large number of occupations for fourteen years and eight months exhibit a wide disparity in the chances of life in different pursuits. The whole number of deaths included in these tables amounts to nearly fifty thousand. These are classified with more care than is usual in the arrangements of similar returns in the other states.

These have been arranged, according to a classification suggested by Dr. Edward Jarvis, of Dorchester, Mass., (including only persons over twenty years of age,) as follows :

	Number of Deaths.	Ages at Death.	
		Aggregate.	Average.
All Classes of Occupations.....	48,283	2,455,858	50.86
I. Cultivators of the Earth.....	12,743	820,433	64.38
II. Active Mechanics Abroad.....	3,620	181,239	50.07
III. Active Mechanics in Shops.....	4,961	235,572	47.48
IV. Inactive Mechanics in Shops.....	5,040	210,768	48.81
V. Laborers, no special Trade.....	9,251	415,311	44.89
VI. Factors Laboring Abroad.....	993	43,639	43.95
VII. Employed on the Ocean.....	3,093	142,363	46.02
VIII. Merchants, Financiers, & Capitalists	4,137	195,571	47.21
IX. Professional men.....	1,513	76,778	50.74
X. Females.....	2,932	134,184	45.76

These observations, which extended over a sufficient length of time, and embrace a sufficient number of each occupation to give a very reliable estimate to the chances of life in each occupation in Massachusetts, exhibit in an eminent degree the superior advantages of an agricultural over a town life, and also a wide difference in the relative chances of life among those engaged in different pursuits in town. The following table prepared by Dr. Jarvis, exhibits the longevity in some leading occupations in Massachusetts, New York, and Rhode Island :

Occupations.	Deaths.	Average longevity.	Occupations.	Deaths.	Average longevity.
Clergymen .....	389	55.36	Tanners .....	230	47.90
Lawyers .....	276	54.76	Merchants and clerks.	2,386	47.46
Physicians.....	540	54.32	Cabinet makers.....	253	46.34
Coopers.....	338	57.4	Shoemakers .....	3,233	43.03
Blacksmiths .....	822	51.51	Painters.....	500	42.37
Carpenters.....	2,052	49.72	Tailors .....	486	41.8
Masons.....	492	48.24			

For the purpose of exhibiting the effect of different occupations upon the expectation of life, Mr. Neison made a table giving the expectation of the life of clerks, bakers, plumbers, &c., which, as compared with the expectation of members of friendly societies in England, is here given.

## EXPECTATION OF LIFE AMONG

Ages.	Members of Friendly Societies in England.	Clerks.	Plumbers, Painters, and Glaziers.	Bakers.
20	43.77	31.83	36.90	40.02
30	36.60	27.57	30.50	32.35
40	29.33	21.85	24.30	24.47
50	22.19	16.04	17.09	19.09
60	15.69	12.42	12.16	14.06

By comparing the expectation of life in the above table with the average age at death, as developed by the Massachusetts returns, it will be seen that, with similar means for determining the expectation among the same classes in Massachusetts used by Mr. Neison in England, similar results as to the relative healthiness or unhealthiness of different pursuits would have been obtained, as will appear from the following enumeration of a few occupations :\*

	No. of deaths.	Average age at death.		No. of deaths.	Average age at death.
All classes in Mass...	48,283	50.86	Coopers .....	368	58.73
Bakers.....	152	44.67	Founders.....	87	42.01
Blacksmiths.....	897	52.17	Glass Blowers.....	31	37.64
Brick makers.....	30	48.80	Plumbers .....	13	36.46
Carpenters.....	2,056	49.93	Painters .....	574	40.04
Clerks.....	690	33.47	Tanners.....	253	47.31

By far the most reliable tables of the expectation of life of a whole community in the United States are those calculated by E. B. Elliott, of Boston, from the returns made from 166 towns in Massachusetts in 1855, and presented to the American Association for the Advancement of Science at its meeting in Montreal, in 1857.\*

Mr. Elliott states that "the aggregate population of these communities, as returned for the 1st day of June, 1855, was 751,241, and the registered deaths in these towns during the same year, was 16,086. The well known Carlisle table of Mortality was deduced from only 1840, deaths registered during nine years, 1779-87, the mean population of the period being 8,177." The following table gives the expectation of life deduced by Mr. Elliott from these returns as well as several others constructed by Elliott, Milne and Farr :

\* Transactions of the American Association for the Advancement of Science, for 1857.

*Average Future Duration (or Expectation) of Life in certain Communities, compared.*

Ages.	Massachu- setts. (Elliott.)	England and Wales. (Farr.)			Sweden and Finland. (Milne.)	Prussia. (Elliott.)	Carlisle. (Milne.)
	1855.	1841.		1838-44.	1801-03.	1839-41.	1779-87.
	Persons.	Males.	Females.	Males.	Persons.	Persons.	Persons.
0	39.8	40.2	42.2	40.4	39.4	36.7	38.7
5	50.2	49.6	50.4	50.2	50.0	47.1	51.3
10	47.1	47.1	47.8	47.5	47.6	44.8	48.8
15	43.0	43.4	44.1	43.6	43.8	41.2	45.0
20	39.9	39.9	40.8	40.0	40.0	37.5	41.5
25	36.9	36.5	37.5	36.6	36.3	34.0	37.9
30	34.0	33.1	34.2	33.2	32.7	30.6	34.3
35	31.0	29.8	31.0	29.8	29.1	27.1	31.0
40	27.9	26.6	27.7	26.5	25.5	23.8	27.6
45	24.6	23.3	24.4	23.1	22.1	20.4	24.5
50	21.3	20.0	21.1	19.9	18.7	17.1	21.1
55	18.1	16.7	17.6	16.7	15.6	14.0	17.6
60	15.0	13.6	14.4	13.6	12.6	11.2	14.3
65	12.1	10.9	11.5	10.9	9.9	9.0	11.8
70	9.4	8.5	9.0	8.6	7.5	7.4	9.2
75	6.8	6.6	6.9	6.6	5.7	6.0	7.0
80	5.0	4.9	5.2	5.0	4.2	4.8	5.5
85	3.7	3.7	3.8	3.7	3.2	3.8	4.1
90	2.9	2.7	2.8	2.8	2.4	3.0	3.3
95	2.3	2.0	2.1	2.1	1.7		3.5

*Average sickness at different ages.*—In addition to the observations of Mr. Neison upon the duration of life, he instituted a series of inquiries to ascertain the relative proportion of sickness among different classes, and at different periods of life. These were followed by those of Mr. Ratcliffe, Corresponding Secretary of the Manchester Unity of Odd Fellows, and Mr. Finlaison, Jun., who was employed for the purpose by the British Government. The investigations of Neison and Finlaison were based upon returns made, under an Act of Parliament, by the friendly societies; and those of Mr. Ratcliffe upon the sickness among the Odd Fellows. The three form the most reliable data on this subject extant.

At the time of Mr. Ratcliffe's publication the members of the Manchester Unity, from whom his observations were drawn, numbered, among those who were recipients of sick benefits . . . . . 243,122  
 Total weeks of sickness, . . . . . 226,917  
 Average to each member, . . . . . 933  
 Average age of members, . . . . . 32

Mr. Ridgely, the Secretary of the Grand Lodge of Odd Fellows in the United States in 1855, reported the number of members for 1854 as	66,021
Total weeks of sickness,	46,833
Average to each member,	723
Average age of members,	35

The mortality was found to correspond nearly with that given in the Carlisle table.

The following table shows, opposite each age, from 21 to 70, the number of members reported, the number of weeks' sickness at each age, and the average rate of sickness per member expressed in weeks and decimals :

Age.	No. of members.	Weeks sick.	Rate of sickness.	Age.	No. of members.	Weeks sick.	Rate of sickness.
21	000	000	.000	46	1125	1024	.911
22	1265	548	.454	47	967	931	.963
23	1732	797	.460	48	1057	1082	1.024
24	2135	999	.468	49	595	652	1.097
25	2458	1190	.476	50	948	1093	1.154
26	2700	1306	.484	51	393	475	1.209
27	2760	1358	.496	52	472	542	1.215
28	3085	1570	.509	53	384	470	1.236
29	2996	1575	.529	54	412	517	1.257
30	3631	1956	.536	55	323	421	1.304
31	2986	1552	.552	56	248	339	1.369
32	2910	1633	.561	57	160	236	1.481
33	2964	1680	.567	58	130	216	1.665
34	3071	1753	.570	59	83	162	1.953
35	3215	1861	.579	60	115	253	2.201
36	2619	1537	.587	61	58	141	2.438
37	2440	1488	.610	62	38	103	2.735
38	2466	1590	.649	63	27	96	3.561
39	2085	1442	.692	64	21	92	4.400
40	2632	1895	.720	65	50	246	4.938
41	1671	1249	.748	66	13	71	5.478
42	1776	1383	.779	67	12	73	6.017
43	1673	1358	.812	68	7	45	6.465
44	1549	1312	.847	69	5	34	6.973
45	1597	1403	.879	70	12	88	7.331

The whole number of Lodges that sent in these statistical reports embraced a constituency of something more than one hundred thousand ; but, owing probably to the inexperience of the officers in making up returns of this sort, a large number of the reports were found imperfect and unavailable for the purposes required.

The comparatively small amount of sickness in Mr.

Ridgely's table, would lead to the belief that the benefits were not always demanded by the whole number of members included in the list, but to what extent absolute sickness existed if any over the amount reported, cannot be determined.

At a later period Rev. J. D. Williamson, of Alabama, collected the statistics of the operations of disease and mortality among the Odd Fellows for ten years, which, although more defective than the returns from English and Scotch sources, are yet of much value. A slight effort upon the part of this numerous and widely extended body might furnish a series of statistics, not only of the highest value to themselves, but of the greatest importance to the cause of science.

This institution, (Odd Fellows,) resembles in many of its characteristics a vast provident society, but it unfortunately contains in its organization some of the most objectionable features found in beneficial institutions. "It is," says Mr Williamson, one of its ablest and most philanthropic members, "in its material aspect and monetary arrangements a widely-extended organization, founded upon the principles of guaranteeism or assurance, and its practical operations are no more or less than an insurance upon the life and health of its members. Its provisions for the sick are an insurance upon health, and its arrangements for the benefit of widows and orphans are an insurance upon life." This society, according to its last report, numbers upwards of 193,000 members, scattered over every portion of the United States, engaged in multifarious occupations, subject to the influences of town and country life of Northern and Southern climates, and, in short, to all the modifications which are known to exercise an important influence over health and disease.

It can furnish the experience of nearly 200,000 years of human life in a single year. It can lay its finger upon the precise amount of sickness and mortality that shall occur at every year of age in that vast circle of human experience, and in ten years it can gather a mass of facts and statistics such as is not surpassed in the world. And yet, with these facts before them, and the lively, nay, vital interest which the members possess in their correct tabulation (for so certainly as they long neglect this subject, just so certainly is their body doomed to inevitable and speedy dissolution) they have up to the present moment failed to bestow upon this subject that attention which its importance and the interests of humanity demand.

The results of these various observers, although different in detail, have nevertheless some marked points of resemblance. The following table gives, in weeks and decimals of weeks, the average time each member of the societies, which fell under their notice, was sick during one year :

SICKNESS IN WEEKS TO ONE YEAR OF LIFE.

Age.	Finlaison.	Nelson.	Ratcliffe.	Williamson.
25-35	.98	.91	.82	.50
35-45	1.18	1.21	1.10	.71
45-55	1.68	2.02	1.91	1.24
55-65	2.84	4.39	4.62	2.76
65-75	6.76	14.77	10.24	8.29

Now all these observations impress us with the important fact, that the liability to disease increases with great rapidity as life advances, and that while among a given number of persons, whose ages range from 25 to 35, the average amount of sickness in each year is less than one week, among those between 55 and 65, it amounts to about four weeks, and among those who have attained the mature age of 65 to 75, it rises to from eight to twelve weeks.

By making a due allowance for superannuation, in which the members are placed upon the sick list, there is still a formidable array of disease in the declining years of life.

My observation would hardly lead me to believe that a similar amount of disease attends the last years of the life of those in more opulent circumstances.

Yet, even here, the same law of increased sickness with advancing years is found, without an exception, to obtain. In all this, we cannot fail to remark how constant and uniform nature is to her own laws. When a law of mortality or disease as it affects a certain place is ascertained, it is easy to foreshadow by its aid what will be the probable amount of sickness and mortality among those of each particular age.

No one if in health is enabled to tell whether he will sicken or remain in health during a given period ; or, if sickness occurs, whether it will be mortal or result in a restoration to health ; much less can an indifferent person single out from a community those against whose breasts the shafts of disease and death will be aimed ; but he can determine with considerable certainty the number of persons who will be attacked by disease, the average duration of disease, and the number of cases which will eventuate in health or final dissolution.



Not only does this hold good in relation to disease and mortality, which present themselves as unbidden guests, and will not be denied admission, but also in regard to those things where we are perfectly free to accept or reject. Take for example the case of marriage, usually a matter of pure volition on the part of those contracting its obligations. Here, as in the case of mortality, masses are found to act in obedience to laws, of which they have either no conception, or do not take into account. It is possible for a statistician in advance, not only to determine the number of marriages which will take place in a given population each year, with much exactness, but likewise to say how many of these will be contracted between bachelors and single women—how many between widowers and widows—widowers and single women—widows and bachelors, and old and young persons. Not one of the persons contracting this ceremony does so for the purpose of affecting this general statistical result; yet, under the influence of the darts of Cupid, they are found to arrange themselves into the aggregate combinations foreshadowed by the man of science.

It is obvious that if these laws are uniform, the society which acts in accordance with them will be competent to comply with whatever obligations it assumes, and that the one that disregards them will be like a ship at sea without guide or compass, always in imminent danger of being stranded upon some hidden rock.

It appears but the part of ordinary prudence for those who are instrumental in founding and governing beneficial societies to ascertain the causes likely to affect them, and to base their future results upon them. Unfortunately such is not the fact; and, as a consequence, their foundations are often unstable and their hopes of usefulness too frequently unreal. Mr. Neison, in order to ascertain the true condition of friendly societies in England, selected at random fifty, in which the total amount of annual contribution for the age of 35 was £1 12s. 3d.; while, in order to supply a benefit of £1 weekly for the period of sickness, which experience showed their members to be liable, the annual contribution should have been £2 7s. 9½d. The inadequacy of such a society to provide for all the benefits it proposes, is evident. "It is a most lamentable condition," he remarks, "in which to find societies aiming at designs so benevolent and praiseworthy."

The importance of this subject in England may be judged from the fact that Mr. Finlaison's tables are calculated upon

the returns of 3,787 societies, embracing 542,900 members—and, from estimates by competent persons, it is believed that the number of those who belong to benefit societies throughout the United Kingdom does not fall short three millions. The number in the United States is likewise very great : but what proportion they bear to the entire population, there are no means of ascertaining. It is a matter for consideration whether a subject so closely interwoven with the welfare of a large class of our fellow-citizens, might not form a legitimate subject of inquiry in the next census.

I have taken some pains to ascertain the condition of friendly societies in this city. The number is large, the membership numerous, and the dues and benefits in most of them discharged with a praiseworthy regularity ; but in none do I find either a correct series of statistics of past operations or a prudent and certain provision for the future. The larger proportion of these societies have been recently organized, few extending back beyond ten or fifteen years, and most of their members are comparatively young men. A society of this kind may survive for twenty-five or thirty years, with all the external appearance of perfect security. Those who manage its affairs finding its income exceeding its expenditure, and a small fund accumulating, are disposed to look upon it as highly prosperous and worthy of all confidence ; but in so doing, they too frequently lose sight of the large increase of expenditure which the inevitable infirmities of its older members will sooner or later require at its hands. The two oldest and apparently best conducted beneficial societies in the city are the Tailors' Benevolent Society, about twenty-five years old, and the Typographical Society, founded in 1809. Neither of these societies has an accumulated fund for future use beyond two or three thousand dollars. Hitherto they have been enabled to discharge their assumed obligations by the falling off of many old members, from various causes, before they become burdensome by the natural march of infirmity, and the accession of young and vigorous members ; but these chance contingencies cannot be supposed always to act in their favor, and the time may soon arrive when the increase of sick allowances will far exceed the income from the weekly stipend paid by their members.

So long as an influx of young members continues, the funds may appear to maintain a position of apparent prosperity ; but when the members shall have passed the meridian

of life, and have begun to experience the infirmities of years, the stability of these societies will come to be fairly tested.

The almost invariable practice is to admit members of every age, not excluded by their age from admission at all, upon the same terms. This is clearly unfair to the younger members, who have not only a large amount of vitality and probable exemption from disease, but will be obliged to delay the reception of their benefits until the society may be in no condition to respond to them. All the contingencies of profit and loss are in favor of the older members and against the younger ones; and it seems but reasonable that the scale of admissions and weekly dues should be graduated with reference to this disparity.

The importance of this subject not only to those who are the immediate recipients of the benefits, but to those whose duty it is to provide for the indigent, when unable to provide for themselves, cannot well be over-estimated. The highest legislative capacity, in the most civilized nations of the world, has always been directed to subjects akin to this. A remarkable feature of our own legislation is that matters of this kind seldom burden our statute book, or the thoughts of our grave legislators.

I allude to these facts for the purpose of showing how little aid can be expected from our own general or municipal governments, until forced to consider these subjects, by a pressure from without, which they will find themselves unable to resist; and to urge upon this Society, whose members are influenced by loftier motives and more disinterested zeal than is now found in our legislative halls, to take this important subject into their respectful consideration. Secure to the laboring classes a safe investment for the money appropriated by them to provide for future sickness, and you will diminish in like proportion the sum required to be paid for the maintenance of pauperism. Let these sums be frittered away in unsubstantial foundations, and pauperism and its associate charges must inevitably increase.

# Geographical and Statistical Literature.

## NORTH AMERICA.

1. *Memoir to accompany the Map of the Territory of the United States from the Mississippi River to the Pacific Ocean, giving a brief account of each of the Exploring Expeditions since A. D. 1800, with a detailed description of the method adopted in compiling the general Map: by Lieut. GOUVERNEUR K. WARREN, Corps of Topographical Engineers, U. S. A. Washington, 1859. 4to.*
2. *Narrative of a Voyage to the West Indies and Mexico in the years 1599 and 1602, with Maps and Illustrations. By SAMUEL CHAMPLAIN. Translated from the original and unpublished manuscript, with a Biographical Notice and Notes, by ALICE WILMERE. Edited by NORTON SHAW. London: Hakluyt Society, M.DCCC.LIX. 8vo.*
3. *Gazetteer of the State of New York: embracing a comprehensive view of the Geography, Geology, and General History of the State, and a complete History and Description of every County, City, Town, Village, and Locality, with full Tables of Statistics. By J. H. FRENCH. Illustrated by original Steel Engravings, and accompanied by a new Map of the State from accurate Surveys. Syracuse: Smith, 1860. 8vo.*
4. *An Arctic Boat Journey in the Autumn of 1854. By ISAAC I. HAYES, Surgeon to the Second Grinnell Expedition. Boston: Brown, Taggard & Chase, 1860. 12mo.*
5. *The Voyage of the "Fox" in the Arctic Seas. A Narrative of the Discovery of the Fate of Sir John Franklin and his Companions. By Captain MCCLINTOCK, R. N., LL. D. Boston: Ticknor & Field. M.DCCC.LX. 12mo.*
6. *Eighth Census, United States.—1860. Act of Congress of Twenty-third May, 1850. Instructions to U. S. Marshals. Instructions to Assistants. Census Office. Department of the Interior. Washington, 1860. 8vo.*

1. LIEUTENANT WARREN'S *Memoir* is a separate impression of a portion of the eleventh volume of the Pacific Railroad Surveys, published by the United States Government. The author gives an interesting and valuable summary of all the explorations west of the Mississippi since Lewis and Clarke, chronologically. This occupies the first four chapters; the fifth describes the method of compiling the author's great map of the territory between the Mississippi and the Pacific, with a list of the principal determinations of longitude; the sixth and last is made up of some important generalizing remarks upon the topography of the Mountain Region of the West. The

*Memoir* is illustrated by four maps, and is accompanied by a full index. Lieutenant Warren's familiarity with the Topographical Bureau at Washington enables him to describe much unpublished material, of which he has availed himself in the compilation of his map. He has been at some pains to settle the question of the discovery of the Great Salt Lake. Mr. Robert Campbell, of St. Louis, a gentleman long concerned in the Rocky Mountain Fur Trade, writes to him (p. 35): "A party of beaver trappers, who had ascended the Missouri with Henry and Ashley, found themselves in pursuit of their occupation on Bear River, in *Cache* (or Willow) Valley, where they wintered in the winter of 1824 and 1825; and in descending the course which Bear River ran, a bet was made between two of the party, and James Bridger was selected to follow the course of the river and determine the bet. This took him to where the river passes through the mountains, and there he discovered the Great Salt Lake. He went to its margin and tasted the water, and on his return reported his discovery. The fact of the water being salt induced the belief that it was an arm of the Pacific Ocean; but, in the spring of 1826, four men went in *skin* boats around it to discover if any streams containing beaver were to be found emptying into it, but returned with indifferent success." In answer to a letter of inquiry, Colonel Bonneville, the veteran trader and explorer, writes from Gila River, New Mexico, as follows (p. 33): "It was from my explorations and those of my party alone, that it was ascertained that this lake had no outlet; that the California range *basined* all the waters of its eastern slope without further outlet; that the Buenaventura and all other California streams drained only the western slope. It was for this reason that Mr. W. Irving named the salt lake after me, and he believed I was fairly entitled to it." Colonel Bonneville first explored the lake, as we gather from another part of his letter, between 1832 and 1836.

2. One of the last publications of the efficient *Hakluyt Society* of London is the translation of an unpublished French manuscript by Champlain, the founder of Quebec, embracing an account of a voyage made in the years 1599-1602 from San Lucar de Barrameda at the mouth of the Guadalquivir in Spain to the West Indies and Mexico. Champlain visited Deseade, Guadeloupe, Margarita, Porto Rico, Hayti, and other of the West India islands, whence he proceeded to Vera Cruz. From here he made a journey to the city of Mexico, where he remained a month. Returning to Vera Cruz he sailed to Porto Bello, then a town of importance in New Grenada. From Porto Bello he went again to Vera Cruz, then to Havana, to Cartagena, and finally set sail from Havana "with the whole fleet of the Indies," for his original starting-point at the mouth of the Guadalquivir. He describes with an accuracy denoting large powers of observation, the various natural productions of the lands he visited. He estimates the population of the Mexican capital at "twelve thousand to fifteen thousand Spanish inhabitants, and six times as many Indians, who are Christians, besides a great number of negro slaves." The author seems to have been the first to propose, what has heretofore been regarded as a modern idea, the canalization of the Isthmus of Darien. While at Porto Bello he speaks of the little river (Cascenjal) at the mouth of which the town is situated, and says: "One may judge that, if the four leagues of land which there are from Panama to this river were cut through, one might pass from the south sea to the ocean on the other side, and thus shorten the route by more than fifteen hundred leagues; and from Panama to the Straits of Magellan would be an island, and from Panama to the New-found-lands would be another island, so that the whole of America would be in two islands."

The work is illustrated by a fac-simile of the original manuscript, a large number of curious drawings, an interesting and well-written biographical notice of Champlain, and many valuable notes. The translation and biographical notice are by ALICE WILMERE, and the whole is edited by the well and widely-known Secretary of the Royal Geographical Society, Dr. NORTON SHAW.

3. The new Gazetteer and Map of the State of New York are far better than anything that has preceded them. The Gazetteer proper is preceded by considerable preparatory statistical matter concerning the State Boundaries, Topography, Geology, Government, Prisons, Military Lands, Canals, Railroads, Corporations, Agriculture, Manufactures, Commerce, Colleges, and Academies, Public Schools, Churches, Religious, Literary, and Benevolent Societies, Medical Societies and Population, arranged in the order indicated, and compiled with commendable care. At page 155 the body of the work commences, consisting of condensed historical, topographical, geological, and statistical descriptions of each county in the State in alphabetical arrangement, and including similar separate accounts of every township. Some of the statistical matter is entirely novel, such as the lists of newspapers which have been issued in the State at different times. The volume closes with a copious geographical index. For the map several counties were re-surveyed, and all the old surveys were carefully corrected. As many topographical details are introduced as the size of the map will allow, and a geological map, a map of the land grants in the State, maps of the various cities, and a time indicator, are all given in connection with the large map.

4. In the summer of 1854—the second summer of Dr. Kane's sojourn in the Arctic regions—a portion of his officers and men, headed by Dr. HAYES the surgeon, Mr. Petersen the interpreter, and Mr. Sonntag the astronomer, resolved to endeavor to escape from their locked-up quarters in Rensselaer Bay to the northernmost Danish settlements of Greenland. Only a meagre account of this bold but unsuccessful attempt was, owing to circumstances, given by Dr. Kane in his interesting narrative. This deficiency, which has often been deplored, is now supplied by the work of Dr. HAYES. After a brief introductory sketch of the voyage of the *Advance* in 1853, and an enumeration of the reasons which induced a part of the ice-bound adventurers to seek relief by attempting to reach Upernavik, the book opens with the departure from the ship of the nine persons (by the return of one, afterwards reduced to eight) who composed the little party. Starting from latitude  $73^{\circ} 37'$ , with two boats, they followed the shore until they reached Cape Alexander, when they took to the sea, visited Northumberland Island, stopped at Netlik, an Eskimo settlement, whence they again hugged the coast to about latitude  $76^{\circ} 40'$ , where they were compelled to abandon their plans. They then effected a return to the brig under difficulties which were surmounted with almost unheard-of heroism, and through sufferings which few participants in Arctic expeditions have been called upon to endure. The episode narrated in the twenty-third chapter—the visit of Petersen and Godfrey to Netlik, their discovery of the treachery of their native hosts, and their subsequent flight to the little hut where their companions remained—is a terrible picture of human courage and perseverance. The party, foiled in their attempts, were at last obliged to commence a painful and hazardous retreat northward to the brig in Rensselaer Bay, where they met with a cordial welcome from Dr. Kane.

The concluding chapter of the work is devoted to a *resumé* of the arguments for a continuation of Polar research. The writer shows that the advance of science

and the additional experience gained during the last few years, have robbed Arctic explorations of one-half of its dangers, and the opinions of a large number of scientific individuals and societies, included in an appendix, demonstrate the interest felt in further discoveries by the learned world. Dr. HAYES proposes to conduct another expedition the present spring through the icy straits of Smith Sound to that open Polar Sea discovered by Morton, and by accurate investigations to throw a much-needed light upon the laws of terrestrial magnetism, upon the phenomena of the aurora, upon the theory of oceanic currents, and upon the fauna and flora of those remote regions.

The book of Dr. HAYES is illustrated by two maps—one of the upper limit of Baffin Bay, and the other of the whole North Polar domain, projected from Berg-haus, Petermann, and the charts of E. K. Kane.

5. It is well known that Lady Franklin, after the return of Dr. Rae in 1854, determined upon a second and final expedition to the scene of the disaster of the *Erebus* and *Terror* at the mouth of Great Fish River, and that the British government did, in fact, send an overland exploring party to that locality in 1855, under the command of Mr. Anderson of the Hudson Bay Company. This was comparatively unsuccessful; and it was not until 1857 that the efforts of Lady Franklin, seconded by Sir Roderick Murchison, succeeded in fitting out the steam-yacht *Fox* to make a thorough exploration of the region surrounding King William's Island. This vessel was placed in charge of Captain FRANCIS LEOPOLD, now Sir LEOPOLD M'CLINTOCK, who sailed from Aberdeen on the first day of July, and reached the Danish settlements in Greenland in the latter part of the month. In attempting to perform the transit across Melville Bay, the *Fox* was enclosed in the ice-pack, where she remained two hundred and forty-two days, or until the latter part of April, 1858. During this period she drifted thirteen hundred and eighty-five miles through Baffin's Bay and Davis' Straits. Captain M'CLINTOCK then returned to Greenland to recruit and refit, whence he proceeded in June directly to Lancaster Sound, and proceeded down the coast as far as Pond's Bay; then steaming northward again, proceeded rapidly through Lancaster Sound, and down Prince Regent Inlet to Bellot Strait. Captain M'CLINTOCK attempted in vain to force his way beyond this strait, and was obliged to winter in a convenient harbor near its eastern extremity, in lat.  $72^{\circ}$  N., which he named *Port Kennedy*. From these winter quarters the various sledging expeditions, which were to clear up much of the mystery which surrounded the fate of Franklin, were sent out. The western coast-line of Boothia, the southern shores of Prince of Wales Land, and the coast of King William Land were carefully explored. The expedition was enabled to trace and lay down no less than eight hundred geographical miles of new coast line. On the western and southern sides of King William Land were found numerous relics and traces of the unfortunate discovery-ships, the *Erebus* and *Terror*. From a document found in lat.  $69^{\circ} 37' 42''$  N., long.  $98^{\circ} 41' W.$ , it was ascertained that the ships commanded by Franklin wintered in 1845-6 at Beechey Island, in lat.  $74^{\circ} 43' 28''$  N., long.  $91^{\circ} 39' 15'' W.$ , after having ascended Wellington Channel to lat.  $77^{\circ}$  and returned by the west side of Cornwallis Island,—that the intrepid and zealous commander died on the 11th of June, 1847—and that the vessels were deserted by the officers and crew, at that time numbering one hundred and five souls, on the 22d of April, 1848, after they had been beset by ice for more than nineteen months. It seems sufficiently evident that all these men perished in attempting to make their way from the locality of their long confinement



to Great Fish River. An appendix to Captain M'CLINTOCK's volume contains some documents relative to his expedition, a list of Franklin relics recovered, and a geological account of the Arctic Archipelago by Mr. Haughton. Two maps, one of the lands explored, and the other of the geology of the whole island-region of Northern America, are attached to the book.

6. One of the sections of the Census act passed by Congress in May, 1850, provides, "That if no other law be passed providing for the taking of the eighth, or any subsequent census of the United States, on or before the first day of January of any year, when, by the Constitution of the United States, any further enumeration of the inhabitants thereof is required to be taken, such census shall, in all things, be taken and completed according to the provisions of this act." The organization of the present House of Representatives having been delayed until after the commencement of the year, any change in the method of enumerating the inhabitants of the Republic was rendered impossible. The schedules, or tables, in accordance with which the returns are all made, will remain the same as those employed in the census of 1850. These are as follows: 1. *Free Inhabitants*, including number of dwellings and families, name, age, sex, color, profession or trade, value of real and personal estate, and birth-place of each free person, with the number of marriages, and of individuals attending school during the year, the names of persons who cannot read and write, and of those who may be either deaf and dumb, blind, insane, idiotic, pauper, or convict. 2. *Slave Inhabitants*, giving their number, age, sex, color, number of fugitives, of manumitted persons, of slave-houses, and of those deaf and dumb, blind, insane, or idiotic, and the names of owners. 3. *Mortuary Statistics*, enumerating the names of those deceased during the year ending June 1st, 1860, their age, sex, color, whether free or slave, married or widowed, place of birth, month of demise, profession, disease and length of illness. 4. *Agricultural Statistics*, giving the names of owners of farms or plantations, quantity of land improved, and unimproved, value of farms and farming implements, quantity, value and kind of live stock, the produce of the year, number of market-gardens, value of home-made manufactures and number of animals slaughtered. 5. *Industrial Statistics*, or names of manufacturers and of business, amount of capital invested, quantity, kind and value of raw materials used and of the annual product, kind of motive-power employed, number of hands and amount of wages. 6. *Social Statistics*, stating details concerning the value of real and personal estate, amount of taxation, concerning colleges, academies, schools, and school-houses, public libraries, newspapers and periodicals, religion, pauperism, crime and labor.

The pamphlet issued by the Census Office gives the Act of Congress, the schedules, and full instructions to those employed in this important decennial enumeration.

## EUROPE.

I. *Küsten und Meer Norwegens*, von A. VIBE, *Chef der Norwegischen Generalstabs-Aufnahmen*. Mit einer Karte von Dr. PETERMANN. *Ergänzungsheft zu Petermann's Geogr. Mittheilungen*. Gotha: Perthes, 1860. 4to.

1. The excellent monograph of Mr. VIBE on the coasts and seas of Norway is published

as a supplementary number of Petermann's *Mittheilungen*. It describes with minuteness the character of the Norwegian coast-line, the depth of the seas which bound it, the effects of the winds and currents, and the nature of the shoals, fishing-banks, etc., in its immediate vicinity. A considerable space is devoted to some novel remarks upon the Gulf Stream, and to the proofs of its existence upon the coast of Norway. The widely-known *Mosken Current* or *Malström* is thus characterized: "The *Malström* appears in the sea between Lofotodden the southernmost part of Mosken-ösö, ( $67^{\circ} 49'$ ), and the island of Mosken ( $67^{\circ} 45'$ ). The sea, therefore, between these two points has a breadth of about one geographical mile. To the south, between Mosken and Warö, and between Warö and Röst, and in general in all the straits which separate the various islands of the Lofolden group, are to be found currents of greater or less force; but none of them ever display the fearful violence which, under certain circumstances, characterizes the *Moskenström*. The cause, or at least one of the causes, of this phenomenon, is the action of the tides; for the mass of water which flows into the great Vestfjord and the more inland fjords with the ebbing of the tide, and goes out again with the falling of the tide, passes through this narrow strait. The *Moskenström* is free from shallow places, with the exception of the so-called Horgan shoals, lying about midway between the southern point of Lofodden and the Högholmer, which are the group of rocky islets at the extreme end of the island of Mosken. Horgan has a depth of no more than forty-two feet, and may easily be recognized, even in a calm; for the sea, without breaking over it, constantly boils and whirls, and exhibits a foaming surface. This peculiar motion and this circular foaming, which are visible here and in other places, in the *Moskenström*, have given it the appellation of *Malström* or *whirling current*, while the local name is *Moskenström*. Besides the action of the tides, the wind and weather also have a marked influence upon the course and strength of the *Moskenström*. When the westerly storms of winter rule the seas, the current generally flows to the east, during both the rising and falling of the tide. At the culminating point of ebb or flow, the stream loses its force, becomes less rapid, and sometimes, for a few minutes, is perfectly quiet, but soon regains its strength, and flows as before towards the east. If, under these circumstances, the sea happens to either rise or fall, the rapidity of the current increases to such a degree as to become wholly unnavigable. It happens not unfrequently in winter that westerly storms prevail in the ocean outside of the Lofolden Islands, and the sea sets strongly towards the land, at the same time that heavy easterly winds are blowing off the islands and the mainland through the Vestfjord. It is especially in cases like this, when the waves meet each other in opposite directions, and the force of the current is unusually strong, that the whole surface of the sea is transformed into immense breakers, rendering it dangerous to approach the neighborhood of the current. Then are formed those great whirlpools, which have given to the current the name of *Malström*, which increase in force and irregularity with the increasing velocity of the current, and render it impossible for a ship, perhaps even for a steamer, to obey the rudder. In summer also, and under circumstances exactly the opposite of these described above, the current may become dangerous. This happens whenever the winds become calm or very light at the moment of passing the current. There is then danger of being driven on the before-mentioned Horgan towards Lofotodden, or on one of the many little rocky islets which surround the island of Mosken. For many miles around this island, and around Warö, which lies to the south of it, the sea is so full of shoals and rocky islets as to be totally unnavigable. The velocity

of the current is greatest between Hel (the south-western point of Loföden) and the Högholmer, and greater near the point first named than in the vicinity of the latter. In many places it flows right against the shore, especially wherever it encounters along the coast the 'Bagevje' (counter-current), which has all the force of the greater current, but flows in the opposite direction. Thus the most dangerous seasons for crossing the Moskenström are during the storms of winter and during calms. But in summer, when a good breeze, steady and not too light, is blowing, there is nothing in the passage to dread; it may then be crossed without danger both by ships and lighter craft. It is very likely that the Gulf Stream which runs along the coast of Loföden and Westeraalen, and at this point flows with greater rapidity than any where else upon the Norwegian coast, may not be without its influence upon the powerful current of Mosken, as well as upon the other violent currents existing among the straits and passages of this region." A map of the Lysefjord, and the neighboring coasts, by Petermann, accompanies the work.

## ASIA.

1. *Geographical and Ethnographical Elucidations to the Discoveries of Maerten Gerrits Vries, Commander of the flute Castricum, A. D. 1643, in the East and North of Japan; to serve as a Mariner's Guide in the Navigation of the East Coast of Japan, and to Jezo, Krafu, and the Kuriles; by P. F. VON SIEBOLD. Translated from the Dutch by F. M. COWAN, Interpreter to the British Consulate General in Japan; with a reduced Chart of Vries' Observations. Amsterdam: Muller, 1859. 8vo.*
2. *Personal Narrative of a Voyage to Japan, Kamtschatka, Siberia, Tartary, and various parts of the Coast of China; in H. M. S. Barraconta. By J. M. TRONSON, R. N. With Charts and Views. London: Smith, Elder & Co., 1859. 8vo.*
3. *A Visit to the Philippine Islands, by Sir JOHN BOWRING, LL. D., F. R. S. London: Smith, Elder & Co., 1859. 8vo.*
4. *Hong Kong to Manilla and the Lakes of Luzon, in the Philippine Isles, in the year 1856. By HENRY T. ELLIS, R. N. London: Smith, Elder & Co., 1859. 12mo.*
5. *Narrative of the American Embassy to Peking, in July, 1859. By S. WELLS WILLIAMS, LL. D. From the Journal of the North China Branch of the Royal Asiatic Society. Read before the Society, Shanghai, October 25th, 1859. 8vo.*
6. *Relatorio da Misão Extraordinária de Portugal a Siam, de que foi encarregado como Ministro Plenipotenciário de S. M. F., o Conselheiro ISIDORO FRANCISCO GUIMARÃES, Governador Geral de Macao. Macao: Silva, 1859. 12mo.*

1. The voyage of Vries to the then unknown regions lying North and East of Japan, was one of the most important and successful undertaken during the seventeenth century. In spite of the various misfortunes encountered, the expedition added largely to geographical knowledge. A century and a half later La Pérouse and Krusenstern, who followed up the discoveries of Vries, speak in terms of the highest praise of the accurate observations and general correctness of the Dutch navigator. After leaving the coast of Nippon where Vries' own vessel, the *Cas-*

*cum*, had waited many weeks in vain for the arrival of her consort, the *Braskens*, the explorers ran along the coasts of Yesso and Seghalien, and among the islands of the Kurile group. Having reached the neighborhood of lat. 48° N. in Patience Bay, on the Island of Seghalien, Vries returned southward to Formosa, where he encountered the *Braskens*. The capture of the captain of this last vessel, with a portion of his crew, by the Japanese, their imprisonment at Jeddo, and final release, are all well known.

The log of this remarkable voyage was discovered three years ago, and was published in 1858, with notes by Captain P. A. Leupe, of the Dutch Navy. The commentary of Mr. SIEBOLD, the distinguished Japanese savant, was written with the object of giving "a careful indication of the course taken by Vries from the island of *Breskens* in the Japan seas, along the east coast of *Nippon*, to and along *Jezo* (Yesso), discovered by him;" of making "a comparative examination and confirmation of this navigator's observations and discoveries, from the point of view of our knowledge of those regions," and of reviewing "the results this voyage has had for hydrography, the natural history of the sea, and for ethnology." The observations of the able commentator have been so arranged as to serve as a mariner's guide for the navigation of the east coast of Japan, and to Yesso, Krafu, and the Kuriles, a work which, since the opening of the port of Hakodadi, has become of paramount necessity. The latter portion of the volume is occupied with an ethnological and philological account of the *Ainoes*, a race inhabiting Yesso, the Kuriles, and the south part of Seghalien, as far north on the west coast as lat. 48° N., and on the east coast up to Patience Bay. They differ greatly from the present inhabitants of Nippon, by whom they were driven to the north several centuries since. They are described by those who have visited them as a quiet, brave, kind, and generous people, but somewhat lacking in strength of character. "Under these circumstances," says SIEBOLD, "after so many thousand years, we still find the *Ainoes* on the lowest step of patriarchal civilization, which, with their separation from the rest of the world, and under the rule of the bold Japanese, they have not had energy enough to go beyond. With such a want of moral energy to be able to refuse the cup of foreign lusts offered them by the polished nations of the west and south, these remarkably powerful but innocent creatures will soon descend to the grave as unnerved and demoralized as their neighbors the Kamtschatdales and North American tribes."

2. H. M. steam-sloop, *Barraconta*, was employed on the East India and China stations in the years 1854, '55, and '56, during which period she visited various parts of the coast of China, Japan, Kamtschatka, Siberia, Tartary, and the Island of Seghalien. An account of these different cruises is given by Mr. THOMSON. One of the most interesting was the voyage to Kamtschatka, of which the following geographical notice is given: "The peninsula of Kamtschatka is between 700 and 800 miles in length; its greatest breadth, 280 miles, in a line with the mouth of the river Kamtschatka, on the east, and the river Moroshetch on the west; from these points it gradually narrows towards the south, to Cape Lopatka, in lat. 51° 2' N., long. 156° 46' E., and on the north, towards 59° N. lat. It lies between 155° and 163° 32' E. long. Bounded on the north by the land of Koriaks, on the south and east by the North Pacific, and on the west by the sea of Okhotsk; it runs in a south-westerly direction, towards the volcanic chain of islands known as the Kuriles. A range of mountains extends through the centre of the peninsula to the 60° of North lat.; many

of these are high volcanic peaks, some in action, others extinct; independently of their range, there are many isolated peaks. Klscheffskai volcano is 16,131 feet in height; to the west and north of this mountain, the Kamtschatka River runs. Many rivers which fall into the sea, on either side, take their rise from these mountains. Three principal rivers, the Bolcha, Avatska, and Kamtschatka, drain a considerable tract of country. The Kamtschatka, the largest, is formed of two branches; one rises in  $54^{\circ}$  N. lat., pursuing a course to the north, receiving mountain streams on either side, and at  $56^{\circ} 23'$  turns to the east; it soon meets with a north-west branch, and, proceeding in the same course, makes a sudden turn south of Lake Nepitch, and empties itself into the Gulf of Kamtschatka. It is said to be navigable for 200 miles. Its banks are fertile, and capable of rearing cattle and growing timber. The climate is more temperate than any other part of the peninsula, being removed from the influence of sea air, and being in the vicinity of volcanoes. The river Bolcha, or Bolshaya, was discovered in 1715; it has its source in the same mountains as the Kamtschatka: and receiving the river Apatcha above the town of Bolsheretsk, runs for 20 miles to the sea of Ohkotsk. It is navigable for large boats to within eight miles of the town. The Avatska pursues a course from north-west to south-east for 100 miles, to the bay of Avatska; this river is navigable only for small boats or canoes." The town of Petropolvski, the seat of Government of Kamtschatka, lies partly in a valley, open towards the harbor, and partly on the side of a hill, east of the harbor; it is sheltered by hills and mountains from almost every wind, unless south and south-west. The author thus describes Seghalien: "The island of Seghalin, Seghalien, or Tarakai, lies between lat.  $54^{\circ} 24'$  N., and  $45^{\circ} 54' 2''$  N., and between the  $141^{\circ} 40'$  and  $140^{\circ} 46'$  of E. longitude. It is about 600 miles in length, the breadth varying very much; in some places, the distance from shore to shore is not greater than 20 miles: near Cape Patience it is about one hundred across; the northern and southern extremities are crescentic prominent capes, jutting out from deep bays. Before the late survey, Seghalien was considered by many navigators to be a peninsula, connected with the mainland below the Amoor River. The country is hilly, wooded, and fertile; a range of hills runs from Cape Lorotoko, or Aniva, in a northerly direction. Coal is found in many parts of the island, especially about Jonquière Bay, where it crops out. Many streams from the highlands fall into the sea of Ohkòisk on the east, and the Gulf of Tartary on the west; and two large rivers empty themselves into Aniva Bay. Vast numbers of salmon frequent the mouths of these rivers; and a Japanese fishing establishment, belonging to the Government, supplies many of the Japanese ports with well-cured salmon. Of the northern part, two thirds belong to Russia, and it is peopled by Ghillecks, and not, as supposed, by Ainos; the latter race, the aborigines of Yezo, occupy the southern third of the island, which is in possession of the Japanese. The Ainos are of short stature, with broad faces, of Mongol type; they live in small huts, and exist on fish and the indigenous fruits and roots of the country. They closely resemble the Kurile islanders."

Charts of value and engravings of interest accompany the work.

3. The north-easternmost portion of the great Indian Archipelago, known as the Philippine Islands, is very imperfectly known to the western world. Discovered by the great Magellan in 1521—finally conquered by the Spaniards, whose power was not completely established until the last quarter of the same century—it has been visited by few travellers and fully explored by none. The narrow-minded and

exclusive policy of Spain for a long while prevented all foreign commerce, and even now trade is subjected to numerous and vexatious restrictions. After the interesting but too fanciful narrative of La Gironière, and the not always accurate work of Mallet, the volume of Sir JOHN BOWRING will be truly welcome. He left Hong Kong November 29th, 1858, and reached Manilla five days afterwards. His book is a resumé of his tour, with chapters on the history, geography, government, population, manufactures, productions and language of the islands. The extent of the Philippines is about 300 leagues from north to south, and 180 leagues from east to west. A range of irregular mountains runs through the whole. The variations of the thermometer rarely exceed 10° of Reaumur—the maximum heat being from 28° to 29°, the minimum 18° to 19°. The difference between the longest and shortest day is 1h. 47m. 12s. The minimum fall of rain in Manilla is 84 inches; the maximum, 114. Hailstorms are rare. The highest mountain, Bansho, is between 6000 and 7000 feet above the level of the sea. Like most other tropical climates, the Philippines are subject to some of the most marked exhibitions of nature's power, such as violent hurricanes, typhoons, inundations, droughts, earthquakes, volcanic eruptions, and raging epidemics. The largest of the volcanoes is that of Mayon, in the island of Luzon. The head of the government of the Philippine Archipelago is a Governor-General appointed by the Cabinet of Madrid, and who resides at Manilla. The islands are divided into provinces, subject either to politico-military governors or *alcaldes mayores*, who are generally civilians. There are four Catholic Bishops, whose sees are Manilla (archbishopric), New Segovia, New Caceres, and Zebu. The general estimate of the population of the entire group is about four millions; but as the Indians, who occupy the unexplored forests and mountainous districts, cannot be included in any official canvass, the calculation must be deemed only approximative. The government furnished the following returns to the *Guía de Forasteros* for 1858:—Natives paying tribute, 1,787,528; *Mestizos* (mixed races) and Chinese tributaries, 78,400; and total population, 4,290,371. The population of Manilla and its suburbs is 150,000. The whole number of European Spaniards in the islands does not amount to two thousand. The different races are the *Indians*, or native races; the *Mestizos*, or mixed population; the *Negritos*, or savage races, not indigenous, but the descendants of invaders and conquerors; the *Moros*, or Mahomedans, of Malayan origin; and a tribe in the remotest regions of Mindanao, in the very lowest stages of barbarism, and resembling the people of Madagascar. The most widely-spread of the languages of the Philippines are the Tagál and Bisayan, each possessing a very great variety of idioms. Many Malayan words are to be traced in these and other of the native tongues. The leading productions are tobacco, coffee, sugar, rice, indigo, betel-root, bamboo, and cocoa. The money value of the tobacco grown is estimated at \$5,000,000. The animals are wild buffaloes, boars, deer, apes, and monkeys, flying-squirrels, tortoises, snakes, lizards, &c. The great insect pests are the white ants (*termes*) and the mosquitos. Gold, produced by washing and digging, iron, coal, copper, various marbles, and mineral waters of many kinds, are found in the group. Many vessels are now built; mats of great beauty, and fibre-wrought hats, are manufactured; and a kind of wine, called *vino de nipa*, is made in large quantities from the sap of the palm. Little has been done for the introduction of improved machinery. The post-office is imperfect and unsatisfactory. Manilla has a fortnightly steam communication with Hong Kong.



The gross revenues of the island are about \$10,000,000, the budget for 1859 being as follows:

RECEIPTS.	EXPENDITURES.
Contributions and taxes ..... \$1,928,607 92	Grace and Justice ..... \$679,519 11
Custom-houses ..... 600,000 00	War ..... 2,216,669 44
Monopolies ..... 7,199,950 59	Finance ..... 5,367,829 83
Lotteries ..... 253,540 00	Marine ..... 904,391 27
State property ..... 12,119 29	Government ..... 272,528 63
Marine ..... 1,388 00	Remitted to Spain ..... 1,011,830 00
Uncertain receipts ..... 21,826 00	
Total ..... \$10,017,841 10	Total ..... \$10,452,728 27

Besides Luzon, Sir JOHN BOWRING also visited the islands of Mindanno (whose capital, Zamboanga, contains a population of 10,000) and Panay (whose chief province, Iloilo, contains 527,970 souls). The four ports of the Philippines now open to foreign trade are Manila, Iloilo, Zamboanga, and Sual.

The value of the present work would have been greatly enhanced by a good map of the Philippines.

4. Mr. ELLIS of the Royal Navy, made in the summer of 1856 a hasty visit to the Philippine Islands, confining himself, however, to Manila and the Island of Luzon, upon which it is situated. The pleasantest portion of his narrative is that in which he relates his tour to the striking lake districts of Luzon. Ascending the Pasig from Manila to the Laguna of Bay, he crossed this sheet to Jala Jala, with which place the readers of La Gironière's "Twenty Years in the Philippines" are familiar, and thence by a shorter sail over the same sheet to the neighborhood of Lake Socol, which he explored. "Its area, nearly circular, comprises a space of between two and three miles in circumference; its sides, equally steep above and below the surface, give on the one hand very deep water close to the edge, and on the other rise in abrupt, thickly-wooded masses, so steep and over-hanging as even at noon-day partially to intercept the sun's rays, and cast over the water's surface a dead, leaden hue, and cold mystery-bearing effect, sufficiently suggestive of its name." Myriads of flying foxes (*vespertilis vampyrus*) of herons and sea fowl of various kinds and of alligators frequent the lake. From here Mr. ELLIS went to the lake of Bombon or Taal and its remarkable volcanic island. "The lake and volcano burst on us in all their beauty and grandeur. The former, a fine sheet of about sixty miles in circumference, and in form oval, is surrounded for the most part, by high, thickly-wooded land, interspersed with huge overhanging rocky cliffs and ridges, that (to a more limited extent) cast over its water the dark, sombre shade so striking at the Lake of Socol, giving to the scene an appearance of calm subduedness, which is finely contrasted with the column of white vapour constantly ascending from the peaked summit of the island in its centre. The latter most probably the offspring of some early volcanic eruption, with its jagged, broken peaks and gray time-worn hue, looks not unlike the ruins of a giant fortress." Ascending the *Isla de Volcan* over masses of black cinders, and across fearful rents and chasms, he found himself at the summit "on the rim of a circular bowl, of six or seven miles in circumference, and of profound depth, its sides being mostly perpendicular, in the very centre of which was a huge black hole, emitting constantly smoke and sulphuric vapor, with a large sulphur pond a little one side of it."

After crossing a chain of mountains which runs parallel to the bay of Manila on the south-east side, Mr. ELLIS returned to Manila.

5. Mr. S. WELLS WILLIAMS, Secretary of the American Legation in China, and a



Sinologue of wide reputation, read a paper before the North China Branch of the Royal Asiatic Society at Shanghai, shortly after the return of the United States Embassy from Peking, giving an account of the visit to the Capital of China. Landing at Pehtang a town of 30,000 inhabitants, situated a few miles north of the mouth of the Peiho, the Envoy, Mr. Ward, and his party were escorted across the plains to Peking. On the afternoon of the 21st of July, the second day after their departure from the coast they arrived on the Peiho, at the village of Pei-tsang, about ten miles above Tientsin. They then followed this stream, the banks of which were admirably cultivated, up to Tung-chau, the head of navigation, containing 400,000 souls. The largest city between Tientsin and Tung-chau was Yangtsun with a hundred thousand people. They reached Peking on the 28th. Mr. Williams details with great minuteness the long negotiations concerning the ceremonial to be used at the presentation of the minister to the emperor. The circumstances of the final exchange of the treaty by means of commissioners are well known.

6. In January, Governor General GUIMARAES of Macao left that city for Bangkok on a special mission from the King of Portugal for the purpose of concluding a treaty of peace and trade with the government of Siam. The pamphlet published by the Portuguese envoy gives an account of his visit to Bangkok, his friendly reception by the first King of Siam, and his success in concluding a treaty. A copy of the treaty and the scale of customs provided by the treaty is subjoined to the narrative.

## AFRICA.

1. *Afrikanische Reisen. Ein Besuch in San Salvador, der Hauptstadt des Königreichs Congo, von Dr. A. BASTIAN. Ein Beitrag zur Mythologie und Psychologie. Bremen: Spack, 1859. 12mo.*
2. *Reisen in Central Afrika von Mungo Park bis auf Dr. H. Barth und Dr. Ed. Vogel, Bearbeitet von Dr. ED. SCHAUENBURG. Erster Band, M. Park, H. Clapperton, R. Lander. Lahr: Schauenburg, 1859. 8vo.*

1. Since the account of Captain Tuckey's unfortunate expedition in 1816, the geographical literature of the century has presented us little or nothing concerning that portion of Western Africa which lies between the Equator and 10° South latitude. Dr. Livingstone, who commenced his trans-continental journey at San Paolo de Loando (lat. 8° 48' S.) made no effort to explore the coast or interior to the North of that point. Dr. BASTIAN, after many years of travel in different parts of the globe, found himself at the Cape of Good Hope, in June 1857, when an opportunity unexpectedly presented itself to visit the Portuguese possessions to the South of the line. He accordingly set sail in H. B. M. Ship Castor, with Admiral Sir Frederic Grey, for Loando, by way of St. Helena and Ascension Island. After a short stay in Loando he proceeded to Ambriz, a trading town at the mouth of the Loge in latitude 8° 2' S. which came a few years back into the possession of the Portuguese. Since that period the English and American factories have been removed to Quinsembo in native territory upon the other or right bank of the Loge. From Ambriz Dr. Bastian went, by way of Shemba Shemba to San Salvador (Ambassee or Banza-Congo) the capital of Congo. Here was built in the 15th century the first church south of the equator.

Here the Christian Kings of Congo for several generations after the discoveries of Diego Cam ruled the whole region watered by the Zaire. Here yet exist ruins of convents and palaces, silent witnesses of its former prosperity. It is still a town of considerable importance, lying upon a broad plateau separated from the neighboring mountains on all sides by ravines or deep valleys and resembling in this respect Jerusalem. After several interviews with members of the royal family and with the chief men of the place, Dr. BASTIAN returned through Pembe and Shemba Shemba to Quinsombo, whence he went to Loando, the chief seat of Portuguese power in West Africa. H. B. M. Steamer Trident, then cruising, offered him the means of reaching Fernando Po, where his narrative closes. The work abounds in ethnological interest, details the mythology and superstitions of Angola and Congo, narrates the history of the rise and progress of Portuguese influence in that quarter of the world, and throws much light upon the story of the slave-trade.

2. In the first book of SCHAUENBURG's popular account of modern travels in Central Africa, the compiler has treated of the early history of African exploration and of the general physical character of the continent. The four chapters forming this book seem to be well condensed. The second, third, and fourth book carry on the story of African discovery from Mungo Park to the third journey and death of Richard Lander. The unfortunate attempt of Houghton, the eventful journeys of Mungo Park, the labors of Nicholls, Röntgen, Adams, Tuckey, Ritchie, Lyon, the interesting researches of Dunham, Oudney, Clapperton, and the Landers, are all told with considerable clearness, and in chronological order. The only omission of great importance in the present volume which we have noticed is the narrative of Caillie, the Frenchman, whose visit to Timbuctoo in 1828 was of the highest interest. The second volume is soon to be published.

## POLYNESIA.

1. *The Story of New Zealand; past and present—savage and civilized.* By ARTHUR S. THOMSON, M. D., Surgeon-major to the 58th Regiment. London: Murray, 1859. 2 vols. 12mo.
2. *Fiji and the Fijians.* By THOMAS WILLIAMS and JAMES CALVERT, late Missionaries in Fiji. Edited by GEORGE STRINGER ROWE. New York: Appleton, 1859. 8vo.

1. The author of the *Story of New Zealand* has compressed into two duodecimo volumes a more satisfactory account of the geography, natural history, ethnology and political history of that important British colony than has heretofore been given to the public. The first part of the work is a description of the country and of the native inhabitants. Of the three islands composing the group, the North Island contains 26,000,000 of acres, the Middle Island 38,000,000 and the South Island 1,000,000; united they have nearly the same area as Great Britain. The entire coast line of the group measure 3,120 miles. Three lines of volcanic craters stretch across the North Island. Between two of these igneous chains the district abounds in lakes, boiling springs, solfataras, tufas and other volcanic products. The Middle Island is traversed by a mountain range, from the north to the south-west, reaching an elevation in some parts of 13,000 feet. In this island there is no evidence

of other than submarine volcanic action. The Southern or Stewart's Island, is of a mountainous character, but no portion of it attains a height greater than 3,000 feet. The largest river is the Waikato in the North Island, which runs a tortuous course of 200 miles. New Zealand is an admirable study for the geologist; there travellers may see the form of Vesuvius, the dome-shaped summits of Auvergne, the elevated crater of the Caraccas and the wonderful geysers of Iceland. The flora of the country is characterised by the comparatively large number of trees and ferns, the paucity of herbaceous plants, and the almost total want of animals. The fauna is very imperfect; there are only two representatives of the land mammalia in New Zealand, and there are two small bats; thirteen sea mammalia are found on the coast, namely, eight whales, two dolphins and three seals. New Zealand possesses only eighty-three species of birds. Neither serpents nor snakes inhabit the island, though there are six harmless lizards; frogs appear to have been lately introduced in some unknown way. Eels, and a delicate fish called Inouga, are the only fresh-water edible fish, but the salt waters of the coast abound in varieties which are used as food. "The absence of indigenous quadrupeds from New Zealand is the most remarkable feature in its fauna, and a feeling allied to wonder steals over the mind when it is found that their places were supplied by a gigantic race of birds, destitute of wings. The New Zealanders denominate this gigantic race of birds *Moas*. Their bones have been discovered imbedded in the sands of the sea-shore, in swamps, forests, river-beds, and in limestone caves. Thirteen feet was the average height of the largest *Moas*: none of them were able to fly, and, unlike all other birds, their leg-bones were filled with marrow in place of air. No large *Moas* have been seen alive since 1650."

The mean annual temperature of the North Island is  $57^{\circ}$ , that of the Middle Island  $52^{\circ}$ . January and February are the warmest months, and June and July the coldest. The nights are about  $12^{\circ}$  colder than the days. Snow seldom lies on the ground at the level of the sea in the North Island, and not very often in the Middle Island. There is more moisture in the atmosphere surrounding New Zealand than in that surrounding England. Proofs of its presence are given in the luxuriance of the vegetation, the heavy night-dews, and the mould which collects on unused shoes and wearing apparel; this is not, however, a raw dampness, for it produces an exquisite softness of the skin. The mean pressure of the wind at Auckland is nearly a pound on the square foot. There occurred at Nelson during eleven years, two solar haloes, twenty lunar haloes, and five extraordinary tides. Fogs are not frequent in the northern part, but increase in number and duration towards the south. Hail-storms and thunder-storms occur. The Aurora Australia is occasionally seen from the Middle Island. The climate is as favorable to the health of the settler as it is to vegetation. No season can be reckoned unhealthy; even the winter months pass over the settlers almost unindicated by an increased mortality.

The natives are of Malayan origin. In stature they almost equal Englishmen, the average height of the male being five feet six inches and a quarter. They are a mixed race, and may be divided into brown, reddish, and black, the brown largely preponderating. Tattooing is extensively practised among them. In character they exhibit the usual vices and virtues of a savage race, being vain, cautious and revengeful, but honest, independent, and indifferent to death. All their faculties seem to be inferior in force and power, however, to those of civilized men.

The second part of Dr. THOMSON'S work is a complete sketch of the history of New Zealand, from the date of its discovery by England, closing with some statistical details of the present state of the Colony. From it, and from the appendix, where the statistics are fuller and arranged in tables, we learn that the number of natives in 1858 amounted to 56,049. The imports in 1851 amounted to 1,000,000*l.*; the exports of Auckland, of which the leading articles are agricultural produce, timber, and Kauri gum, amounted in the same year to more than 1,000,000*l.* in silver; the total amount of exports was 369,394*l.* The revenue of the Colony in 1852 amounted to 248,257*l.* The European population in 1858 was 59,305 souls. The live stock in the possession of the settlers was 14,912 horses, 122 mules and asses, 137,204 cattle, 1,523,324 sheep, 11,797 goats, and 40,734 pigs. The whole number of acres under crop among the colonists were 140,988; the whole number fenced amounted to 235,541. The statistics of mortality in the British army show that the proportion of deaths among the corps stationed in New Zealand is not half as great as in the most healthy of all the other military stations.

The third part of the *Story of New Zealand* is "On the Decrease of the New Zealanders, their Progress in Civilization; with Hints to Emigrants." The author gives it as his opinion, "drawn from statistical and other evidences, that the New Zealanders have, from the causes enumerated, sustained, during the last thirty years, a continuous decrease of one per cent. per annum—a rate of mortality which, if it goes on unchecked, must soon blot out the race from the land." The book closes with a valuable statistical appendix, comprising twenty-five tables, and an accurate chronological bibliography of works on New Zealand.

2. No comprehensive work upon the Fiji islands, their geography and ethnology, their history and the customs of their inhabitants has ever been published. The efforts of Mr. WILLIAMS, and Mr. CALVERT, two intelligent missionaries long resident in the Fiji group to supply this deficiency, demand the commendation of the geographer. The work is divided into two portions; the first includes eight chapters on the geography and history, the origin and polity, the wars, the industrial produce, the people, their manners and customs, the religion, the language and literature of Fiji. The second part is devoted to the mission history of the group. Mr. WILLIAMS says "modern geographers class Fiji with the Tonga group, entitling them all "the Friendly Islands." There is no good reason for such a classification; but there are several which show it to be erroneous, and demand its discontinuance. Geologically considered, the groups are different. The inhabitants also belong to two distinct types, having between them as much difference as between a Red Indian and an Englishman. Their mythologies and languages are also widely diverse. These facts protest against the confounding of the two groups in one." The writer favors a division of the group into eight parts as follows:

The *ONO GROUP*, comprising Ono, Ndoi, Mana Undui, Yanuya, Tuvana-i-tholo and Tuvana-i-ra.

The *LAKEMBA GROUP*, beginning with Vatoa, and ending with Tuvutha and Thithia; thirty-three islands and islets.

The *EXPLORING ISLES*, with Mango, Kanathea, Naitaumba, Vatuvava, Yathata, and a number of islets.

*MIDDLE FIJI*, containing Maku, Totoya, Moala, Ngau, Nairai, Koro, Ovalau and a few smaller islands.

*VANAEA LEVU* and Taviuni, with their contiguous islands—about fifty in number.

148 *Geographical and Statistical Literature—Polynesia.*

GREAT FIJI, with the fifty islands on its coasts.

The KANDAVA GROUP, numbering thirteen islands.

The YASAWAS, including more than thirty small islands

The entire group comprises not fewer than two hundred and twenty-five islands and islets, about eighty of which are inhabited. Every class of insular formation is to be found, from the simple form of the coral isle to the rugged grandeur of volcanic structure. Violent shocks of earthquake are sometimes felt; the main temperature of the climate is  $80^{\circ}$ ; the prevailing winds from April to November are from the E. N. E; during the rest of the year there is much variation. There can be little doubt of the Fijian's connection with the darker races of Asia; in his color, physical conformation and language the Asiatic characteristic of the East Polynesians and the African peculiarities of the West Polynesians seem to blend. The total population is estimated at 150,000. The language is a member of that wide-spread family of languages known as the Oceanic or Maylayo-Polynesian type of human speech, which extends from Formosa and Hawaii in the North Pacific as far south as New Zealand, and from Eastern Island in long.  $109^{\circ}$  West to Madagascar in long.  $45^{\circ}$  East. There are fifteen or more dialects of the Fijian. Missionary efforts in Fiji commenced in 1835 and against great obstacles have progressed until nearly every portion of the group has been visited. The work is illustrated by a map of the Fijis.

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